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GAS JOURNAL

LIGHT ♦ HEAT ♦ POWER ♦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

VOL. CXLIX., No. 2965.] TUESDAY, MARCH 9, 1920. [72ND YEAR.

EDITORIAL NOTES.

London Gas Bills—The Dividend Question.

So far there has been no blocking in the House of Lords of the Bills of the South Metropolitan and South Suburban Gas Companies. They were accorded a second reading last Thursday, and were committed. What fate will overtake the heat-unit and financial revision sections when they come before a Committee (which we should imagine is hardly likely to occur before the Easter recess) can only be just now a matter of conjecture. Of course, the promoters have lodged their Bills with full knowledge of the risks they are running, in view of the promised Government Bill or Bills; but it is a pity that, owing to the absence of information as to the intentions of the Government, much work is being done, and expense incurred, that will, at all events in part (if the sections in question are held up), be wasted. Briefs are being prepared, and so is evidence. This is necessary; but it will depend upon the course of action taken by the Government whether the work as it stands will be of any immediate benefit, or will have to be modified to meet the circumstances created by the Government measure. However, preparation has to be made, and events awaited.

While mentioning these matters, it may be remarked that the more we hear from responsible men connected with gas companies regarding the financial situation of the industry, the more it is found that the opinion is gathering ground that a good stand must be made to secure a fair dividend in the altered circumstances of the times for existing capital, in order to restore as far as possible its market value and the investment attractions of the industry, as well as to substitute justice for injustice. In addition to these considerations for a fair dividend, are the facts that the proprietors mostly paid premiums for their stocks and shares, and have during the war, when the last thing desired was a lowering of income from their investments, had it reduced by from 40 to 50 p.ct., and this with a much heavier income-tax. Gas proprietors have no objection to do patriotically their individual part in meeting the country's heavy obligations; but they do object to being at the same time treated worse than other investors in industry or trade. They do not want anything that can be described as inordinate. The South Metropolitan and South Suburban Companies are asking for 6 p.ct. on the existing capital; and the former—and very properly too—are making provision which it is believed when conditions settle down will assure in future the payment of 6 p.ct. The Government are at the present time offering Exchequer bonds bearing 5¾ p.ct. interest, with the guarantee of the State behind, and redemption at par. Local authorities are authorized to offer 6 p.ct. interest on housing loans. Investment, too, can be made in substantial industrial concerns, and 7 and even 8 p.ct. interest can be obtained. If the first part of our "Electricity Supply Memoranda" this week is read, it will be seen that electric supply companies, who have not the same statutory limitations as gas companies, are paying dividends which must be highly satisfactory to the proprietors; and, in order to enable this to be done, prices are charged which cover fairly the service rendered by capital. The City Electric Lighting Company have actually begun to pay something on account of the shortage of dividends during the war years. We do not hope for this in the gas industry. But the case strengthens, if it wants any strengthening, in favour of (while the whole question of gas finance is in a state of flux) asking for a dividend of sufficient dimensions to set the existing capital as firmly on its feet as formerly.

The Coal Shortage.

THE weekly coal output is still keeping at good figures, as measured by the best standards of recent months; but, of course, the production falls deplorably short of that of 1913. In the first five weeks of the present year, the output was 20 p.ct., or one-fifth, less than in the same period of 1913, notwithstanding that there are now 1,170,000 men at work at the mines, compared with a number 60,000 lower seven years ago. It is calculated that, if the men at present employed were as productive as the men were in 1913 (of course, the seven-hour day is now in existence), the output should be in an uninterrupted week 6,150,000 tons, instead of which the production during the week ending Feb. 21 amounted to 4,855,845 tons and the week before to 4,897,311 tons, which are fairly representative figures in these times. Several gas-works are complaining of coal-stores almost swept clean, and of a perilous condition of things in respect of the gas supply. We are glad for this matter to be impressed upon the Coal Controller (Mr. A. Ray Duncan) from any quarter, and as frequently as possible; for the position is indeed a very serious one. The National Gas Council have been unremitting and urgent in their attention to the question; and their efforts have now been supplemented by the National Union of Manufacturers, a deputation from which waited upon the Coal Controller last Friday. We are afraid the members of the deputation did not advance much that he had not heard previously. But their appearance before him shows how widespread is dissatisfaction over the coal supplies to industry; and additional emphasis has been placed upon what Mr. Duncan has been told on former occasions. The deputation did not concentrate their attention on the gas industry, but spoke of industry generally; and, when referring to the jeopardy in which the service of the South Staffordshire (Mond) Gas Company had been—relief has since been given—there was allusion to the fact that some gas-works were in a critical plight for coal. That is true; and so much so, that some of their managers almost dread the approach of the week-end. The Coal Controller has on past occasions promised that gas-works should receive special attention; he has promised it again. The gas industry, upon which millions of people depend for light, heat, and power, would hail with delight the first signs of real improvement. Another point that the deputation raised is one that the gas and electricity industries have been unavailingly hammering away at the last three or four years. That is the large proportion of incombustible material that coal still contains. What occurs in the large coal-consuming gas industry occurs, in less degree, in all industries. The supply of all inert material in excess of normal means so much additional uneconomy and inefficiency in every industry; and the rubbish has to be transported to the extent of 10 to 25 p.ct. of the total coal carried. If the Ministry of Transport wants to put the coal-wagons of the country to the most profitable use, the gas industry as well as other industries can show Sir Eric Geddes how it could and should be done. All the result that accrued would be of mutual advantage, and so of value to the entire country.

A Powerful Bargaining Clause.

THE novel proposal the Great Northern Railway Company make in their Bill—that they should be allowed to buy gas, water, and electricity where they please, and convey one or the other or all where they like for use on their system—has aroused a mass of opposition from the gas and other industries concerned. It should also interest non-supplying local authorities, because, though supply is given

by a company, the local authorities are interested in seeing that the producing value of their area is not affected by such an enactment, nor the selling prices in the locality raised by the railway company's custom being diverted elsewhere. The opposition to the clause showed its head in the House early last week, when the Bill was up for second reading. The fact that the proposal is novel, and would (if sanctioned) create a precedent, was pointed out; the injury the power might do to existing authorized undertakings was commented upon; the fact that it was creating a preferential right which is not allowed to statutory undertakings was urged. On behalf of the Metropolitan Water Board a point was made, which might prove very awkward for an undertaking. The Company would have power to buy where they pleased, and vary their custom at will. The Company obtain water from the Metropolitan Water Board at varying prices according to quantity; and by drawing heavily upon the Board for requirements at 6½d. per 1000 gallons, they would be able to make things very uncomfortable for the Board and their supply area. The Board are not at all anxious for such custom—particularly in these times of high capital and operating costs. Practically all the speakers saw a depth of power in the clause which would enable the Company to serve their ends in regard to gas, water, and electricity with a freedom that would ignore the existing rights of suppliers the full length of their trunk lines and branches. But Sir F. G. Banbury, who is a member of the Board of the Great Northern Company, tried to clothe the clause with an innocence that its very definite phrasing does not warrant. The reason the clause has been included in the Bill, according to the honourable member, is that there are cases where it is not possible to obtain a supply through another authority, or where the other authority have pipes or cables only a considerable distance away. The explanation is a bit nebulous; and obviously the clause is intended to give much wider powers. If it was only required for exceptional circumstances, then it would not be difficult to insert in it confining passages. With all respect to Sir F. Banbury, we can see the clause being used to enforce terms of a generously preferential character, and for enabling the Company to by-pass all the smaller undertakings that could not compete with the larger ones. However, the Bill was allowed a second reading. But the Ministry of Transport are going to report on the clause, which will then be dealt with by the Committee to whom it is referred. They will find that there are not many people in addition to the Company who will have a good word to say for it. If the precedent is created now, other railway companies will not be very long before they approach Parliament with a similar application.

Benzol "Profiteering" and an Inaccuracy.

If the Sub-Committee appointed by the Standing Committee under the Profiteering Act to consider and report upon the question of the prices of motor fuels had set out with the intention of discouraging the home production of such fuels, they could not have proceeded to work in a better way than they have in the report which was published last week. Of course, they had no such intention. The price to the consumer was their single thought and objective; but for the purpose of reaching it safely, there was one important fundamental requisite missing—the Committee have proved themselves totally unqualified to consider the matter from the technical standpoint in relation to production, which is at the very foundation of costs. If their proposals are adopted in regard to the control of the prices of benzol, then the supply from this source will not rise in volume, but must decline, as no maker would be tempted, in the present circumstances, to make any special effort to enlarge production at the Committee's price. Another matter for regret is the slur cast by the report upon benzol producers, in company with the petrol magnates, in respect of unduly profiting from the commodity. The public are not in want of any official documents to inflame their feelings in this regard, and especially official documents that are manifestly based on insufficient knowledge of the facts.

The petrol people do not like the report any more than do the benzol producers—perhaps they are more annoyed over it than the latter; and it may be that the grounds of the Committee's finding, that petrol charges are excessive, have more reality than have those on which the Committee assert that motor benzol should be sold at a lower price than that now ruling. The Committee's recommendation is that the price of No. 1 petrol should be reduced to 2s. 10½d. per gallon, and No. 3 petrol to 2s. 8½d., and that benzol (in which there is more power than there is in petrol) should come down to 2s. 8d. The big controlling oil companies are concerned in petrol right away from the source; and in the case of the American commodity, a very considerable profit appears to be made before shipment at New York. That is where the largest slice of profit is taken. But our concern is with benzol. It does not seem to have struck the Committee that, if benzol recovery had been a highly profitable business, fewer gas undertakings would have stopped production since the Armistice. The attraction that there is in the price with present working costs has not been sufficient to hold-up the level of production that was reached during war time. Before the war, the Committee record, the home production was about 17 million gallons per annum. It went up to 42 millions during the war, of which the gas industry contributed some 10 million gallons. Now the total production is no more than at the rate of 25 millions. From the point of view of national interests, this fact is one of the most serious in the report. It does not speak of the encouragement of benzol production; yet every gallon by which it has been reduced means another gallon, or rather more, of petrol to be imported. And the country's economic position is crying out loudly for a better showing on the export side and a lessening of the total volume of imports.

However, let us consider the proposal to bring down the price of benzol. The Committee assert that the price has been regulated by the National Benzol Association, simply to conform with the price of petrol, and is not based on the cost of production. It would be highly interesting to examine the members of the Committee on this statement, to ascertain how much knowledge they possess to vouch for its accuracy. If the Association regulated the prices of benzol simply to conform with the price of petrol, they might, in view of the intrinsic value of the former, have put the price somewhat in excess of the latter. But they have not done so. They have sold at a price which they can well justify; and the benzol consumer has had the advantage of the pence per gallon charged below petrol—*plus* the increased mileage that there is in the gallon of benzol. The Committee make up the 2s. 8d. in this way: To producers for the crude benzol, including profit, 1s. 4d. per gallon, which is not an alluring figure for many of the smaller and medium sized gas-works. To the 1s. 4d. the Committee add 6·5d. for the refiners, 5·5d. for distribution, and remuneration to garages 4d. (which last figure compares with the actual present allowance of 5d.).

Where the Committee have gone astray, through lack of technical knowledge, is in regard to the largest element in the total price. The National Benzol Company, Ltd., have called public attention to this. The Committee have proceeded on the assumption that a gallon of crude benzol gives the exact equivalent quantity of refined motor benzol; whereas an average quality of crude benzol will only give approximately 63 p.ct. of motor benzol, 5 p.ct. of naphtha, and 20 p.ct. of creosote; the balance (12 p.ct.) representing loss in refining. This means that 1·6 gallons of crude benzol are required to produce 1 gallon of refined motor benzol, which would cost 2s. 1½d. The Company present a balance-sheet, compiled from the Committee's own figures, with this correction as to the quantity of crude benzol required for producing 1 gallon of motor benzol. To the 2s. 1½d., the 6½d. for the refiners is added—making 2s. 8d.; and there is deducted the value of the other products, 5d.—making 2s. 3d. The Committee's figure of 5½d. as the cost of distribution is added, as well as their garage figure of 4d.—making the total 3s. 0½d. per gallon. Now how would it be possible for the producers at the present time to sell, on the Committee's figures as corrected in the one particular, refined motor benzol at 2s. 8d. per gallon? Then, again, why the Committee should allow the petrol people 6·197d. *plus* a profit to the distributor of 1·5d.—making together 7·697d.—while for similar service the British producer of benzol is only permitted 5·5d. for distribution without any allowance for profit (thus favouring the companies dealing in imported motor spirit) is one of those recondite matters which the ordinary man of affairs cannot penetrate. If anything, the costs of petrol distribution should be much lower than those of benzol distribution—seeing that twenty times as much petrol as benzol is handled. If the same allowance for distribution was made to benzol as to petrol, there would be 2·197d. to add to the 3s. 0·5d. —making 3s. 2·697d. Again, we ask, how is the proposed

28. 8d. justified? It is a great pity that, before the Committee inflicted public damage upon the home-produced motor spirit, they did not make sure of the grounds upon which they were proceeding.

The Committee see danger of a world famine of motor spirit. This has been seen by other people for a long time past. In fact, it is quite obvious that the output of petrol is not proceeding *pari passu* with the growing mechanical road transport in all parts of the earth. The difference between the two will increase. As it does so, the petrol-producing countries will have first claim on the native spirit. Therefore the imperative necessity for the Government is to encourage home recovery of benzol. The Committee also urge the production of power alcohol. If this comes about, it is a matter in which the gas industry will have to assist; but benzol will be as urgently wanted then as now. It would be interesting to know whether the Committee think that the proposals in the report in regard to benzol really constitute a diplomatic way of providing an incentive to production. Other people may be excused if their intelligence permits them to conclude otherwise.

Waste of Ammonia in the Gas Industry.

These are not the times when anything of value should be wasted in gas-works. We boast of a high efficiency in connection with the utilization of coal; and yet the industry is constantly being convicted of allowing leakages to proceed which are a direct loss to it. One of the most persistent accusers in this connection has been Mr. W. S. Curphey, the Chief Inspector under the Alkali Works Regulation Act (this in connection with ammonia), and all that can be done is to admit that the accusation is deserved. An illuminating contribution to the subject is made in our columns this week by Mr. D. V. Hollingworth and Mr. E. J. Fottrell, both of whom were working for the Ministry of Munitions when ammonia was of more vital importance to the nation than at any other period of our history. Now they have (with the consent of the authorities) taken the returns for the year 1918, and have subjected them to an analytical investigation; and what Mr. Curphey has accused the industry of in general terms, these investigators have, in respect of a large part of the coal carbonized, fastened upon it with statistical nails which can only be removed by improved working. Their contribution is very thorough in the presentment of the facts; and it covers the various contributory sources of ammonia where the carbonization or other use of solids proceeds—the gas, coke-oven, producer, blast-furnace, shale, and bone works of Great Britain.

Of course, it has to be admitted that the year 1918 was an abnormal one. Nothing was taking its usual course. Labour was short, materials expensive and difficult to get, and so it had been impossible to maintain a high standard in the upkeep of plant. Carbonization was not being carried on with that methodical control that can be given to it in normal times; the quality of coal was of a character that invited severe reproach; and steaming had also come in to make a variation in ammonia-recovery efficiency, and to help to emphasize the efficiency shortcomings of other works. Therefore, the whole of the blame that 1918 imposes upon gas-works in regard to indifferent ammonia recovery (the investigators acknowledge) cannot be attributed to avoidable circumstances. But we are afraid—in fact, know—that the considerable variations of many years' showing in ammonia production per ton of coal are not due solely to carbonization method or nitrogen content of the coal, but are largely owing to want of control, and the application of practical means of preventing loss. So the two investigators are safe in drawing attention to the great possibilities that exist for improvement in production. The results in the article are all expressed as sulphate of ammonia of 25 p.ct. quality. The returns of some 426 gas-works in which sulphate is manufactured are dealt with; and out of these only 177 make upwards of 20 lbs. per ton, while 249 produce below this, some of them being conspicuously bad. The 177 carbonized 7,147,391 tons of coal; and the 249 carbonized 4,884,824 tons. These figures indicate that the higher efficiency is realized in the larger works, which is as might be expected. But what is not expected, and what should not exist, is the self-condemnatory sulphate of ammonia makes of the works carbonizing some 40 p.ct. of the total coal used by the 426 undertakings. There are 17 works that made upwards of 30 lbs. of sulphate, and over 40 lbs. was reached by a couple of the works. There are 41 that produced between 25 and 30 lbs. At 119 between 20 and 25 lbs. were made. The same number of works produced between 15 and 20 lbs. This is bad enough; and if it were not that it would be a disservice to the industry, we should like to draw a veil over the remainder. But here they are: No less than 98 works turned out only between 10 and 15 lbs. per ton; and it would hardly be believed were not the facts before us that 28 works did not do better than between 5 and 10 lbs. There were four small works that can claim the record place for bad operation by adding to the world's wealth with less than 5 lbs. of sulphate per ton of coal. We are not pleased with this record; and all the excuses that our brains could conceive would not provide a sufficient cover of justification. Through this bad working, the average yield of 25 p.ct. sulphate of ammonia is brought down to 22·42 lbs. per ton of dry coal. It might incidentally be mentioned here that in making the calculations as to dry coal the figure that has been used as representing the moisture content of the coal is 5·49 p.ct., though, in the case of some of the smaller works, 4 p.ct. was found more nearly to represent the facts.

In one half of the year 1918, the returns from about 700 works were dealt with, and about 800 works in the second half, where the ammoniacal liquor was sold. The quantity of coal carbonized by these works in the year was 4,590,421 tons. Expressed as 25 p.ct. sulphate of ammonia, the average yield would be 22·2 lbs., which is not so bad when compared with the average of the works producing sulphate of ammonia *in situ*. But it is clear that the investigators are disappointed with the detailed figures which they had before them; for they comment on the fact that the yields per ton of coal are not so high where the liquor is not worked-up as they are where it is. They suggest that low efficiency is due to insufficient technical supervision and inadequate plant. A matter upon which Mr. Curphey has often commented is the waste of ammoniacal liquor that proceeds at many small works through the want of facilities for disposal. Messrs. Hollingworth and Fottrell from the returns for 1918 have traced no less than 336 small works, carbonizing an aggregate of 135,000 tons of coal, where the liquor was absolutely wasted. Of course, there was great difficulty with transport in the war years; but it is satisfactory to learn that, by the end of 1918, the number of works running liquor to waste had been reduced to 217. This is better; and it is hoped that by this time a considerable number of the large remainder have found means of supplementing their revenue from what has hitherto been wasted.

The bye-product coke-oven industry did not always do so well in sulphate of ammonia recovery as it did during the year 1918. But to think that the gas industry shows overall a better ammonia efficiency than bye-product coke-oven plants is a fallacy that can no longer be maintained. There are very few plants making less than 20 lbs. of sulphate of ammonia, or the equivalent, per ton of wet coal; and the production of the greater number varies between 25 and 35 lbs. One plant exceeds a production of 40 lbs.; three, 35 lbs.; 36 range between 30 and 35 lbs.; and an equal number between 25 and 30 lbs.; while 33, come between 20 and 25 lbs. There are only seven below. The average (on the dry coal basis) of 26·1 lbs. for the coke-oven industry compares well with the average of 22·42 lbs. of the gas industry. Of course, the coking industry has the advantage of using a washed coal; and the carbonization of a wet coal undoubtedly gives a larger yield of ammonia, due to the liberation of nitrogen by the steam evolved, which has also a protective action. This is borne out by experience with the steaming of vertical retorts, and by what is accomplished with gas-producer plants and at shale-oil works—regarding the productions of which our contributors give some highly interesting data. In connection with the information as to producer plants, we are reminded of a point made in relation to the adding of lime to coal before carbonization at the Cheltenham Gas-Works. Mr. Paterson has always claimed that the ammonia yield is improved through this practice; and now Messrs. Hollingworth and Fottrell say that at one of the producer plants where the highest yield of ammonia is obtained, the general practice is to add to the coal prior to its gasification a proportion of slaked lime.

It is hoped that the particulars given by our contributors will act as an incentive to better ammonia recovery in the gas industry, by higher productions and the prevention of losses. Before long the industry will, whether it likes it or not, have to sell its ammonia at lower rates; and one way of cheapening the production will be by obtaining a larger yield per ton of coal carbonized.

Cost of Coal Control.

Coal control is not carried on for nothing. It was stated last week, during the consideration of the Coal Mines (Emergency) Bill by Standing Committee A of the House of Commons, that the expenses of the department for the current financial year might be put at £750,000.

The Passing of a Hostile M.P.

There was a time when the South Suburban Gas Company, and in fact any gas company, could not do anything right in the eyes of Mr. James Rowlands, M.P. for the Dartford Division of Kent. He seemed to look upon gas companies as people who were always designing schemes for robbing the public; and he could never see that gas companies were fully cognizant of the fact that their own best interests were those of the gas consumers. Many are the lively brushes that the Directors of the Company named above had with Mr. Rowlands. He was a man of very strong opinions, and once formed no power on earth (at any rate so far as gas was concerned) would shift them; and his manner of expressing them left no doubt in the minds of those who heard him that he believed he was right. Away back in the nineties he was President of the Gas Consumers' Protection League—a body we had almost forgotten ever existed. But gas matters will not again trouble James Rowlands. His end came last week, just when the South Suburban Gas Company had a Bill in Parliament which would have given the late M.P. splendid scope for the display of his inveterate hostility.

A Forty-Four Hour Week.

A Bill has been introduced into Parliament by Mr. Will Thorne, the General Secretary of the Gas, Municipal, and General Workers' Union, providing for the regulation of hours and the conditions of employment, which, interpreted our way, means a Bill to interfere with the liberty of the subject, and to deprive him of the right to dispose of his services to the most profitable advantage. If the Bill becomes law, it would be a penal offence to employ any person for more than forty-four hours a week, or for more than eight hours during any one day. Overtime may be worked; but—and this would bring every workshop and factory under trade union domination—only in accordance with an agreement arrived at between the employer and a trade union or unions representing the workers. Not less than time-and-a-half is to be paid for overtime. All contracts of service affecting payment for overtime that are contrary to these provisions, it is proposed, shall be null and void. Penalties for infraction are provided for. If this sort of thing goes on, labour will not be long before it finds itself loaded with an amount of statutory harness that will be very irksome.

Chemical Workers and Income-Tax Allowances.

A novel, but quite just, claim emanates from a Joint Committee of the British Association of Chemists, the Institute of Chemistry, and the National Union of Scientific Workers. It is that the following expenses should be treated as a charge against income in arriving at the assessment of those who earn their living either by purely scientific pursuits, or by the application of science to industry: (1) Subscriptions to scientific and technical societies, libraries, and periodicals. (2) Purchase and renewal of scientific and technical books, instruments, apparatus, chemicals, and other materials. (3) Rent and expenses of laboratory or study. (4) Travelling and other expenses incurred in attending scientific meetings or congresses. (5) Provision of special clothing, and renewal of clothes damaged in the course of employment. (6) Other expenses incurred in the course of research. The General Secretary of the British Association of Chemists (who is to be found at Bedford House, York Place, W.), it is understood, would be glad to receive information in regard to special cases in which any of the above have been definitely allowed or refused. However just the claim, we are a little bit dubious about preferential consideration being given to chemical workers. It would open the door to numerous applications of the same character in relation to other lines of work.

Raising the Status of Engineering.

The Bill which the Institution of Civil Engineers have introduced into Parliament, with the view of raising the status of the engineering profession, by compelling all persons who are practising as civil engineers to be registered, and by preventing the use of "C.E." after the names of persons unregistered, has caused the Institutions associated with branches of engineering to look into the question of the principle involved. The first result is that there have been friendly conferences with the Council of the Civils; and there is good hope that a settlement of points at issue will be effected. If there is not, then in defence of the interests of the members of the branch organizations, the alternative course will have to be taken—to offer opposition to the Bill. Engineering, of course, has many branches in which men specialize; and this one fact alone differentiates it from the medical and legal professions. We should like to see the status of engineering raised, and set in their right places those little-minded persons who delight in printing "C.E." after their names without having any right to the qualification conveyed by the letters. But these ends must be attained without inflicting injury in the slightest degree upon men practising in one or other of the constituent parts of the profession.

PERSONAL.

After an absence extending from nearly the commencement of the war, during which, in connection with his work in the High Explosives Department, he has been closely associated with the gas industry, and President of its chief organizations, Lord Moulton has now returned to his judicial duties in the House of Lords.

The General Purposes Committee of the London County Council report that Sir Eric Geddes, the Minister of Transport, has offered Sir Harry Haward, the Comptroller of the Council, the appointment of an Electricity Commissioner. The Committee acknowledge the able and valuable services rendered to the Council; and the gas industry know of his loyalty to the policy of the Council in relation to gas affairs. There is one uncertainty until to-day's meeting of the Council as to whether Sir Harry will accept the proffered appointment. He could not do this if it involved the sacrifice of the superannuation benefits which have accrued during his 38⅔ years' service. The Committee feel sure that, in view of the fact that he will leave to undertake important service for the State, the Council will wish Sir Harry to retain his pension benefits; and they recommend that he be allowed to retire on March 31, and that a superannuation allowance of £1206 3s. 7d. a year be granted to him.

OBITUARY.

Mr. W. Garbutt, whose death has taken place at the age of 61, spent 47 years of his life in the service of the Newcastle-upon-Tyne and Gateshead Gas Company. In 1896 he was appointed Chief Accountant, retiring in June, 1918, in consequence of ill-health.

Gas for Making Extracts.—The number of extracts on the market is quite large; and it is probably safe to say, remarks Mr. Gilbert C. Shadwell, in the "American Gas Engineering Journal," that at least 50 p.ct. of them require heat for their complete production. That gas is the most satisfactory fuel is due to the fact that in many cases the heat has to be gentle—often in the form of a water bath which is secured by means of a water-jacketted kettle. The heat must be capable of being readily manipulated, and under proper and quick control.

Oiling Gasholders.—The "Technical Review," quoting from Herr E. Körting, in the "Journal für Gasbeleuchtung," says the practice of oiling gasholders in lieu of painting them is becoming common in Germany. It is effective; and the saving in cost of paint is considerable. In the case of the great Berlin-Schöneberg holder, the actual cost of oil was 3520 marks, against an estimated cost of 200,000 marks for paint. The practice dates back from 1900, when it was applied with good results in Vienna. Later, in 1910, eight large holders at a Berlin gas-works were subjected to this treatment; and no painting or repair has been done to them since. Any light oil, free from acid, may be used. The oil is poured on the water in the tank, and in the cups in high holders. A layer of 0·394 in. is sufficient. The overflow from the tank is so arranged that only water, not the oil, is discharged; but care must be taken to avoid syphoning. Only the top of the bell and the upper portion which does not dip into the water have to be painted. The oil gives a thin protecting film to the metal plates. If the latter are corroded, the oil softens and removes the rust. The Vienna holder was badly corroded when the oil system was adopted. Recently, the 160,000 c.m. holder in Berlin-Schoneberg was provided with the oil layer, and, down to the present time, with satisfactory results. The system may be successfully applied to the purifiers.

INSTITUTION OF GAS ENGINEERS' PROGRAMME.

Annual General Meeting.

AT the request of the Council of the Institution of Gas Engineers, Mr. Walter T. Dunn has issued the following provisional programme for the annual general meeting, which will be held at the Institution of Mechanical Engineers, Storey's Gate, Westminster, on Tuesday, Wednesday, and Thursday, June 1, 2, and 3, under the presidency of Sir Dugald Clerk, K.B.E., F.R.S.

TUESDAY, JUNE 1.

Preliminary business, including the appointment of Scrutineers for the election of officers and members. Address by the President. Annual report of the Council. Report of the Gas Investigation Committee.

In the evening, the members and ladies are invited to a reception and dance to be given by the President and Lady Clerk at the Royal Institute of Painters in Water Colours, Piccadilly.

WEDNESDAY, JUNE 2.

Annual general meeting of contributors to the Benevolent Fund, after which the meeting of the Institution will be resumed.

Discussion of the report of the Gas Investigation Committee. Report of the Refractory Materials Research Committee, and of the Life of Gas-Meters Research Committee. Report of the Institution Gas Research Fellow.

THURSDAY, JUNE 3.

Reading and discussion of papers. Scrutineers' report of the ballot. Election of honorary members. Concluding business.

FRIDAY, JUNE 4.

It is hoped to arrange for a visit to some place of popular interest. Ladies would be invited.

With a view to the completion of the programme, the Council will be glad to receive at an early date offers of papers for reading.

BENEVOLENT FUND.

The Committee of Management of the Benevolent Fund are anxious to obtain new subscribers, in order that the income may be sufficient to provide for the continuance of the grants now being paid, and to enable them to be in a position to consider new applications for assistance.

Unfortunately, owing to the death of a number of annual subscribers, the amount received as subscriptions has for several years past not been sufficient, and donations have had to be expended to make-up the sum required. Any amount from 5s. upwards will be gratefully accepted.

Williams's New Gas-Heating Arrangement.

In these days when all fuels (including gas) are at high prices, the largest possible economy and efficiency that can be effected in use is a matter of mutual benefit to both gas suppliers and consumers. To reduce gas consumption, and yet increase the quantity of heat distributed in a room, has been the aim of Mr. Percy F. Williams in a new invention which we have had the opportunity of inspecting; and there is every satisfaction that, with a modest consumption of gas, a large amount of heat is given off. Of course, it is a physical impossibility to get more heat out of any fuel than there is in it; and so it will at once be apparent to technical men that the gain in heat with this new heating arrangement is obtained by bringing into use, by convection, a good proportion of the heat that is ordinarily carried away by the products of combustion. The new heater (which has been patented) can, of course, be made to any size, and to satisfy any consumption of gas or heat requirement. The one we saw was a fire with a seven-nozzle burner, consuming 21 c.ft. of gas per hour. The fire itself is of ordinary appearance with upright fuel; and it renders a good account of itself in the form of radiant heat. The fire is centrally situated at the bottom of a casing, the construction of which forms the subject of the invention, and about which there will be more to say at a later date. High costs call for economy; and therefore the new heating arrangement has been designed to answer the call. It is understood that a Company will shortly be brought out to exploit this and other inventions by Mr. Williams.

Midland Association of Gas Engineers and Managers.—The annual meeting of the Association will take place in the Grand Hotel, Birmingham, on Thursday of this week, at 2.30, when the new President (Mr. James R. Duff) will deliver his address. There is also to be a discussion on "Gas and Housing Schemes," to be opened by Mr. R. J. Rogers. At the conclusion of the meeting, the members are invited to take tea with Mr. Duff.

Gas for Removing Paint and Enamel.—It is stated by the "Lumen" that in removing enamel and paint from articles preliminary to re-painting, gas is found to be a highly efficient aid. The new plan is to immerse the articles treated in tanks of hot water mixed with a chemical compound. Gas is used to heat the water; and it is found, by properly directing the heat of its flame, that the high temperature necessary is reached much more quickly than when other fuels are employed. Several of these tanks are in operation.

ELECTRICITY SUPPLY MEMORANDA.

ELECTRICITY supply companies have something upon which to congratulate themselves, and room for a little sympathy with their less fortunate and older kin, the gas companies. They have no sliding-scale to interrupt the making and distribution of profits—a sliding-scale which gas companies found worked all right while the times continued to cherish approximately the economic conditions that existed at the birth of the regulating device but which with the flight of costs ran dividends downhill at breakneck speed. Some of the electricity companies during the war have shed 1 or 2 p.ct. from their dividends; but nevertheless they have throughout managed to put up their charges to figures that have supplied the stock and share holders with dividends over which they could not grumble. Among others, we see the St. James and Pall Mall Company are paying 12 p.ct. for last year; and the Westminster Electric Supply Corporation, 10 p.ct. The City of London Electric Lighting Company make those of us who are gas shareholders a bit envious; and we want to know why their capital should be treated differently from our capital. It comes from the same source as that of the gas industry—the public, though probably gas companies can show a larger proportion of small investors, which is the greater reason for generous consideration. The City Company are paying 10 p.ct. for last year, with—mark this you gas proprietors who are now on bended knees asking Parliament for mercy and justice by revising the financial terms on which the sliding-scale part of the industry does business!—a bonus of 3 p.ct. on account of reductions of dividend during the war; thus restoring to the pre-war level the rate of dividend for 1914 and 1915, and leaving the reductions for 1916, 1917, and 1918 to be dealt with later on. What a nice outlook. There is no chance of back-dividend shortage being made up for gas shareholders. They would have been overjoyed if they could have had the 8 p.ct. of the County of London Company (an increase of 1 p.ct. on 1918), which was the same percentage as was paid by the Newcastle-upon-Tyne Electric Supply Company. There would have been supreme contentment over the Charing Cross (West-end and City) Company's 7 p.ct., which is also the rate the Kensington and Knightsbridge shareholders are dividing. There would have been gratitude over the 6 p.ct. of the South Metropolitan Electric Light Company, or even of the Chelsea 5 p.ct. A myriad of gas shareholders in sliding-scale concerns are, under the parsimonious Statutory Undertakings (Temporary Increase of Charges) Act, getting £2 12s. 6d. and £3 p.ct.! Is that fair? Gas and electricity are similar commercial undertakings; and they ought to be treated alike. But it is the old industry, and the one that submitted in normal times to more stringent control than the newer one, that has suffered most.

The Dividend Difference.

A Power Company's Experiences.

The increases last year in the consumption of electricity do not, in the case of ordinary supply undertakings, appear to be on particularly attractive lines—in fact, in many places, there have been decreases. This is due to less being required for industrial purposes, and to the new level of costs. Turning from town conditions to the Yorkshire Electric Power Company, who have found that the ill-wind of high costs is blowing them some good. This Company for years struggled against strong opposition, and with a big distribution system from which there was not drawn electrical energy in that amount which was necessary to produce a good reward for the enterprise. But the tide has turned; and the current, so the report indicates, is flowing strong to, it is hoped, a permanently larger prosperity. The Company are paying 8 p.ct. dividend; and this is traceable to the difficulties of other suppliers. In 1912 and 1913, no dividends were paid; in 1914 and 1915, 1 p.ct. was the dividend; in 1916, 3 p.ct.; in 1917, 5 p.ct.; in 1918, 7 p.ct.; and now for last year 8 p.ct. Dividend paying is a war-time development. Applications for power have come in more freely of late, due no doubt to the trouble of manufacturers with coal supplies. The great change in fortune, however, is owing to the troubles of the small stations, which even in more advantageous circumstances were uneconomical, but, under the weight of costs double and treble what they were before, the uneconomy has become still more oppressive. Then there is the cost of labour, materials, and capital; and some existing undertakings have found that it is more economical under present conditions to draw supplies in bulk from the surplus capacity of the Power Company than to renew or enlarge their own plant. Whether they will always be of the same opinion will depend upon costs in the future. It seems that out of fifty-three undertakings in the area of the Company, arrangements have been made in forty-one cases for a bulk supply or for joint working. It must not be thought that we are suggesting that the Power Company have escaped increased costs. They have not. For example, while salaries and wages paid in 1913 equalled 27 p.ct. of the total expenditure, they were equal to 40 p.ct. in 1919; and this upon an expenditure on a much higher level per unit of output in 1919 than in 1913. But with the diversity of the demand upon the Company, and the fact that they possessed a capacity for more business than they were previously doing, additional custom is to them a welcomed

blessing; and it can be earned at a proportionately lower rate than plant could be put down for in these times by their new customers.

Joint Authorities.

In some areas electricity authorities are bubbling over with enthusiasm in getting on to lines which shall have their terminus in the formation of a Joint Electricity Authority. There is the threat of compulsory formation of Joint Boards as the penalty of neglect, and the Joint Boards may have compulsory power to purchase the electricity generating stations. There is no power of this kind at present in existence; but it is proposed to incorporate it in the supplementary Act. The local authorities, therefore, want to make a show of doing something, and to give evidence of their desire to be good according to the standards laid down by the Act already passed. Reference was made in the "Memoranda" on a previous occasion to the movements in the direction of co-operative generation among the existing suppliers; and there is additional activity. In the reports of various London electric companies it is observed that the leading ones have associated themselves for the purpose of setting-up a joint electricity authority. It is hoped that, with the formation of such an authority, arrangements may be put in force whereby the best and most effective use will be made of the resources and experience of the different undertakings which will result in electricity being sold at the cheapest possible rate, while at the same time the rights and interests of the shareholders will be safeguarded. In the provinces, the latest scheme is one for Cheshire and Flintshire. The local authorities have held a conference to consider the matter. The Electrical Engineer of Chester (Mr. S. E. Britton) estimates that within the district there is a good potential demand for power. It is believed that the ultimate scheme will be to group the districts round the North Wales power station; and a large generating station might be erected on the Mersey to supply places on both banks, including Liverpool and Birkenhead. Hastings—with its dismal electrical history—is also ambitious. The Corporation Electrical Engineer (Mr. R. F. Ferguson) has been turning over the matter in his mind, and looking out for a suitable site for a big generating station. He has found one near the L.B. & S.C.R. at Bulvershythe; and there, so he is of opinion, a large station could be erected to supply an extensive area parts of which are under the jurisdiction of other local authorities. Inquiries among these authorities are stated to be generally of a satisfactory nature in respect of support. Sir John Snell, the Chief Electricity Commissioner, has given the idea his blessing; and Mr. Ferguson has been instructed to go into the matter in more detail. These big schemes are going to cost a great deal, at the present prices of materials, labour, and money; and there is more reason than ever for the Electricity Commissioners ensuring that the undertakings are so administered that they will pay their way. It is high time electricity supply was carried on as any other ordinary commercial undertaking. Under the old municipal electrical mode of doing things, there has been too much robbing of the ratepayers, in order to make up the deficiencies due to undercharging the users of current. Whatever the cost, those who wish for the service should pay for it.

The Problem.

Will all these schemes eventuate in what is wanted by some of the electrical enthusiasts? They desire to oust all competition, and to waste the country's coal resources by supplanting by electricity more economical forms of heat energy. Mr. Hugo Hirst, of the General Electric Company, has been talking plainly to the industry. The electrical papers have tried to appear as hugely jubilant over the show that electricity made at the Ideal Home Exhibition; but behind all they have had to say, there has been detected the shadows of the knowledge that electric efficiency has not shown any advance upon what existed before the war, and that progress among consumers has been very effectually dammed by the prices at which current can be vended to-day. Mr. Hirst very frankly said he was disappointed with the position that electrical appliances showed to-day compared with the pre-war days. They are now as they were then. It is, however, the cheaper production of electric current that must precede all else. The problem he puts to the electricity supply industry is current at one-eighth or one-tenth of a penny; and then there would be some hope of big advances being made. But what chance can there be of such a *sine quâ non* being attained? Everything is opposed to it; and the electrical engineer looks round for an opening through which he can escape from the debarring conditions. The result is always the same. The conditions are impenetrable, and have to be borne.

The Critic and Absent Knowledge.

Our amiable friend "Electrical Industries" refers to the South Metropolitan Gas Company's stand at the recent Ideal Home Exhibition as a "peculiar" one. The justification for the adjective is not apparent. The writer thinks that the demonstration made by the Company of the extraordinary exactitude they bring to bear upon the production of the "Metro," burner must have suggested to the visitor that he should "avoid anything which is so extraordinarily delicate in its constitution. The finished product is not delicate in its constitution—not half nor a quarter as delicate as the vacuum or gas-filled lamp, nor does its production require the same delicacy as must necessarily be showered upon the latter. Our contemporary does not understand the reason for the accuracy with which the parts of the "Metro" burner are produced. It is simply this, that the Company have set themselves to supply a gas made to a standard prescribed by themselves; and for the consumption of this gas they make appliances which call for no regulation. Hence the need for an exactitude which does not exist where regulating devices are part of the burner itself. The writer goes on to sneer at gas, because (so he says) it has never been able to approach the achievement of the all-electric house. How many such "achievements" are there in existence? The gas industry has not a gas-operated vacuum cleaner, nor a gas-operated boot-brushing machine, nor a gas-operated knife-cleaner. But the gas industry will light and heat rooms, cook food, and provide hot water for any house with an economy of money and time with which the electric industry cannot vie. Some foolish remarks are made about carbon bisulphide. There again the South Metropolitan Gas Company go in for a refinement which many other scientific and practical men avow is unnecessary. What the Company are doing in this respect is something in excess of statutory enactment; and yet the Metropolitan Gas Referees are men with scientific attainments possibly in excess of the writer of "Gossip" in "Electrical Industries." Of course, we should not like to incur ill-will by saying so definitely.

An Intelligent Heating Suggestion.

The cost of living has gone up, on an average, to somewhere between 135 and 154 p.ct.; and the electrical people are anxious that it shall rise still higher by wasting coal to generate electricity for heating, and by the consumer paying vastly more for electric heating than for heating by some other labour-saving process. The "Electrician" now makes a remarkably intelligent suggestion—so far as dwellings are concerned. It says that where tariff charges for electricity are such that the heating of large buildings or houses entirely by electricity is ruled-out on account of cost, it is often possible to add to the efficiency of the primary heating system by employing electric radiators to supply additional heat when required. Of course, its idea is that steam, hot water, or hot air should be employed as the primary system—for dwelling-houses the counsellor could not have advised a more uncomfortable method of heating. There is nothing like radiant heat for personal comfort and healthy conditions in rooms. Suppose householders take the advice, what is it going to add to the already high cost of living? A steam, hot-water, or hot-air system costs to instal something rather on the heavy side; and there are the running expenses. To add to this our contemporary would have the householder instal a system of electric heating, with its high initial, maintenance, and running costs. Perhaps our friend will scarcely believe it, but we can assure him with the fullest confidence that the major part of the people of these isles could not afford to follow his advice.

Masonic—Northern Star Lodge.

The Installation Meeting of the Northern Star Lodge, No. 3053, was held at the Midland Hotel, Manchester, on Friday, Feb. 27. W.Bro. Thornton Ousey, P.M., P.P.G.Stwd. (Cheshire), was duly installed Worshipful Master by W.Bro. Joseph Taylor, assisted by the P.M.'s of the Lodge. The following brethren were duly appointed and invested as officers for the ensuing year:

W.Bro. Thornton Ousey, P.P.G.Stwd. (Ches.)	W.M.
W.Bro. Joseph Taylor, P.M.	I.P.M.
W.Bro. R. H. Garlick, P.M.	S.W.
W.Bro. A. J. Harrison	J.W.
W.Bro. L. B. Taylor, P.M.	Chaplain.
W.Bro. T. W. Jordan	Treasurer.
W Bro. Wm. Batt, P.P.G.S.D., P.P.G D.C. (West Lancs)	Secretary.
W.Bro. S. Meunier, P.M.	D.C.
Bro. M. L. Williams	S.D.
Bro. Ernest West	J.D.
Bro. Frank Richmond	I.G.
W.Bro. J. R. Lee, P.P.G Stwd.	A.D.C.
W.Bro. John Fisher, P.M.	Assistant Secretary.
Bro. S. Shadbolt	Organist.
W.Bro. R. J. H. Sayers, P.P.G.A.D.C. (West Lancs)	Almoner.
Bro. J. W. Turner	Senior Steward.
Bro. C. Fairweather	Junior Steward.
Bro. J. Bridge Bro. R. H. Brown Bro. R. Neill Bro. Fred Turner Bro. F. Hyland	Stewards.

Lodge Charity Representative: W.Bro. F. J. West, P.M., P.S.G.D.

The twenty-sixth "James Forrest Lecture" will be delivered at the Institution of Civil Engineers on Tuesday, April 20, at 5.30, by Sir Dugald Clerk, K.B.E., F.R.S., M.Inst.C.E.; the subject being "Fuel Conservation in the United Kingdom."

Next Saturday afternoon, at 2 30, members of the London and Southern District Junior Gas Association will assemble at the Goswell Road industrial appliance show-rooms and workshops of the Gas Light and Coke Company, for an inspection. Mr. B. W. Brooks will conduct tests and explain various processes. At a business meeting of the Association on Friday evening, March 26, Mr. Edward G. Stewart (of the Fulham works of the Gas Light and Coke Company) will read a paper upon "Heat Conservation and Water Gas."

COST OF MOTOR FUELS.

Committee's Report.

There was issued last week by the Board of Trade the report of a Sub-Committee of the Standing Committee on the Investigation of Prices, who were appointed to investigate costs, prices, and profits at all stages in respect of petrol, benzol, and other motor fuels. Petrol is dealt with first in the report; but this portion may be passed over here. An editorial article on the subject (published on an earlier page) points to a serious inaccuracy in the Committee's benzol calculations.

The Sub-Committee find that the present high prices for motor fuel are mainly due to a demand which is tending to outstrip the world's present supply, and that advantage is being taken of this tendency by powerful financial interests to raise prices. As an illustration of the extraordinary rise in the price of that commodity in the last few years, they say that an important company making large use of commercial petrol were able, in 1914-15, to obtain ample supplies at 5⅛d. per gallon, exclusive of duty. The cost of similar spirit to the company to-day is 2s. per gallon, exclusive of duty. The gravity of the situation is increased by the fact that practically all the sources, not only of supply, but of the machinery of transport and distribution of petrol, are mainly controlled by the same interests.

Position and Price of Benzol.

Benzol, say the Sub-Committee, is a bye-product obtained from the gas produced in the distillation of coal, and is home-produced. There are three sources of supply: (1) Coke-ovens, where (in addition to gas) the hard metallurgical coke is produced which is used in the iron and steel industry; (2) gas-works, which, in addition to gas used for household and power purposes, also produces the softer coke used in domestic grates and furnaces; (3) various systems of what are known as low-temperature carbonization processes, producing smokeless fuels and oils, as well as gas. These latter processes at present provide a negligible portion of our supplies. Tar is obtained in all three of the systems mentioned; and a certain proportion of benzol is also obtained by the tar distillers when treating this product.

The production of benzol before the war was about 17 million gallons per annum; and owing to Government encouragement during the war, the output was increased to some 42 million gallons, of which approximately 32 million gallons were produced by coke-ovens and 10 million gallons by gas-works and tar distillers. Since the armistice many coke-ovens have had to be repaired on a very large scale; and also many gas companies (being short of coal supplies) have discontinued the practice of scrubbing for benzol. The output has therefore fallen very considerably, and is now estimated to be in the neighbourhood of 25 million gallons per annum.

They find that the price has been regulated by the National Benzol Association simply to conform with the price of petrol, and is not based on the cost of production. The rise of 4d. per gallon in the price, which took place on Jan. 26, is probably due partly to the fact that the Anglo-American Oil Company have secured a large refinery in Yorkshire, and are competing with the National Benzol Association to secure crude benzol. The Sub-Committee fear that the entry of the petrol companies into the field of benzol refining may have a very great effect on the production of benzol in this country. They consider that, in order to minimize the danger of the position, not only the price of refined benzol sold as motor spirit should be fixed, but also that of the crude benzol, from which it is obtained. If the price of crude benzol be not fixed as suggested, they feel that the whole of the production of crude benzol will eventually pass into the hands of the petrol companies, and that as a consequence, benzol will disappear entirely from the market as a competitor of imported petrol. They recommend that the price beyond which crude benzol should not be sold should be 1s. 4d. per gallon.

The Sub-Committee find that:

(1) The price of benzol is regulated by agreement among the producers through the National Benzol Association.

(2) The benzol producers have fixed the commission to the garages at 5d. per gallon, and that this is excessive, and should be fixed at 4d. per gallon.

(3) The price of benzol or any spirit containing or admixed with benzol and/or toluol should be fixed at 2s. 8d. per gallon, made up as follows:

To producers, including profit	1s. 4·0d.
To refiners	0 6·5
Cost of distribution	0 5·5
Remuneration to garages	0 4·0
Per gallon	2s. 8·0d.

(4) The export of benzol and/or toluol should be prohibited.

Power Alcohol.

The Sub-Committee say they are aware that unfortunately the recommendations they make in the report can only be considered as palliatives to the present alarming situation; and they are convinced that the only ultimate solution of the motor fuel problem is the production of home and/or Empire produced power alcohol.

They are also of opinion that, unless steps are taken by the Government to control the production of power alcohol, any marked development in the production of power alcohol would, in present circumstances, result in a similar monopoly to that which now obtains in the case of petrol. They think, therefore, that steps should be taken to ensure that the production and distribution of power alcohol shall be under Government control.

There is a grave danger of a permanent world-famine in motor spirit, even at fabulous prices. The sole remedy for this country is a largely increased production of home and/or Empire produced motor fuel. Power alcohol is the only potentially unlimited source of supply. The Government should use every possible means to foster the production of power alcohol, and place no restriction on the production and use of power alcohol in this country.

A further report on heavier oils will be submitted when the Sub-Committee's inquiries into this branch of the industry are complete.

COAL CONSERVATION AS AIDED BY GAS.

Taking as his subject "Coal Conservation as Aided by the Gas Industry, with Notes on Town's Gas and Its Industrial Applications," Mr. George Keillor, the Engineer and General Manager of the Greenock Corporation Gas-Works, had plenty of material (of which he made good use) for a paper which he read last Tuesday to the Scottish Association of Engineers and Shipbuilders. His facts were set forth in convincing manner, and in print make up a booklet of quite substantial thickness. Other matters likely to be useful to his audience are dealt with in separate pamphlets, containing a reprint of an article by Mr. J. J. Mulgrew, on the use of gas in shipbuilding on the Pacific Coast (particularly for rivet heating), and much further information by the same gentleman on the same subject.

In his own paper, Mr. Keillor brought to the notice of the Association well-authenticated facts showing to what a limited extent even electric super-stations are capable of economizing coal, as compared with the gas and bye-products industries. He argued that only through the gas industry can the great engineering and shipbuilding industries usefully assist in conserving the nation's coal reserves, and then went on to deal with the proposed new legislation which is to completely revolutionize pre-war methods of gas production, and the uses of town gas for industrial purposes. With the object of obtaining gas for steam-raising, it seems, it has been seriously suggested that a certain low-temperature carbonizing company should be invited to set up costly works in their midst; and the company, "who have not yet made good elsewhere, are so solicitous of the welfare of Greenock manufacturers, that they are prepared to give them gas for next to nothing as an inducement to join the Board and share in the losses which they hope to make on the voluminous sale of bye-products expected, but not realizable, from average Scotch coal."

It is, Mr. Keillor said, estimated that the 40 million tons of coal now annually consumed raw for household purposes could be replaced by gas for a net consumption of 30 million tons of coal—*i.e.*, net-coal used—coke residuum. To do the same useful work for the consumer by electricity generated at the average station to-day, a consumption of 120 million tons of coal would be necessary; the most economical station yet constructed would use 80 million tons. It has already been pointed out by Sir Dugald Clerk and Lord Moulton that if the economy talked of by the advocates of super-stations were achieved, the consumption would be 60 million tons, as the loss of heat would still be over 80 p.ct. According to Sir Dugald Clerk, 82·7 p.ct. of the energy of a ton of coal is secured after carbonization at a modernly equipped gas-works (Prof. Bone puts it as high as 89 p.ct.). But if coke is converted into water gas at the gas-works, it has been proved possible to obtain 50 p.ct. of the whole heat of the coal in the gas delivered. The best electrical stations to-day give 13 p.ct. thermal efficiency of generation; and, at 1·34 lbs. of coal per electrical unit, the proposed super-stations would only give 19·6 p.ct. From this, commented Mr. Keillor, it appears that, in capacity for heat production, the average of the gas industry is at present fully nine times that of the average of the electrical industry. For heating, it has been stated that electricity, to compete with gas as a fuel in cost for equal work done for the consumer, must be supplied at a price per unit not greater than 1 p.ct. of the price of gas per 1000 c.ft.

As a means towards true coal economy, Mr. Keillor strongly advocated the use of town gas in industrial operations. If real coal conservation is aimed at, and the use of "flat-flame gas" is made prohibitive, what, he asked, is the alternative. "The alternative is simply the production and distribution of a gas devoid of valuable hydrocarbons, of high flame-temperature, and non-luminous in a flat-flame burner. In other words, a quality of gas must be produced which will enable gas undertakings to put into the mains the maximum number of heat units from each ton of coal carbonized, and at the same time recover all the benzol, ethylene, and other bye-products so essential for the needs of the country." With a higher carbonizing temperature than is usually employed in the production of rich gas, and with the steaming of the charges within the retorts, 11 cwt. of coal will produce as many gaseous heat units as 20 cwt. formerly—thus offering a great saving in coal and transport. After careful study, it appears to him that the standard of heating value best suited to a large industrial town like Greenock is 400 B.Th.U. For some time past the supply has averaged 425 B.Th.U. gross; and, judged by results, it has proved eminently satisfactory for incandescent lighting and heating purposes generally. On numerous occasions, indeed, with coal scarce and exceedingly bad, the calorific value has had to be reduced to 410 B.Th.U., without any increase in the normal complaint list. This, however, added Mr. Keillor, may be attributable to the fact that, having early recognized the co-operative advantages of supplying practically non-luminous gas, suitable district preparations were made in anticipation of the new order of things, with results satisfactory to buyer and seller. As to the future, he thinks that, given a large increase in gas consumption for industrial purposes (and this is how manu-

facturers can help to conserve the national coal supply), together with the mutual benefits which will accrue from the abolition of old and the introduction of new gas legislation, the price of gas will probably be less.

Mr. Keillor is disappointed to find that, in an important industrial centre like Greenock, the gas undertaking is not called upon to supply gaseous energy to a greater extent; and the final portion of his paper was devoted to show shipbuilders and others [with the aid of the lantern] how many ways there are in which they could advantageously employ gas in connection with their work.

THE PRICE OF GAS.

By Norton H. Humphrys.

On and after the 1st of April—a not entirely unappropriate date—the nominal price of gas will become a different figure from the actual payment received from users of gas for household, domestic, and certain trade purposes—representing in many districts more than 90 p.ct. of the total consumption of gas. The remainder includes users of large quantities for industrial or power purposes. Whether a manufacturer taking gas by the million will be satisfied to pay 10 to 20 p.ct. more for a similar article than the tenants of a row of cottages near his entrance gate, is an open question; and some will be inclined to fight it out with the gas company, regardless of the Coal Prices Order. The fact that the position did not originate inside the industry, but was forced upon it from outside, cannot be made too prominent.

Even if no commercial issue turned upon the nominal price, other than that upon (say) beef or beer, matters of this nature, together with the countless disputes that will arise where gas for all purposes passes through one meter, and a guess must be made as to the proportion entitled to any rebate, this will unnecessarily increase the strain on officials who, after five years of abnormal exertion in meeting interference and restriction in connection with legitimate operations, have not unnaturally, but erroneously, expected that a return to normal conditions would follow the declaration of peace. But while the profits made by the butcher or the publican are not concerned, the question of the rate of dividend for the unfortunate gas shareholder, under existing statutory enactments, hinges upon—not the price at which gas is actually sold, but the nominal price. Any undue or unnatural inflation of this figure is, therefore, of vital moment, as the very existence of the gas undertaking turns upon ability to conform to the price regulations. These should be preserved in cotton wool in a safe place. If left loose for a Government department or any other authority outside the Board room to play football with, the result cannot be other than disastrous.

Among the numerous details affected by the nominal price of gas may be mentioned:

1. The percentage rate of dividend to the shareholders.
2. The degree of popularity among users, and the prospects for new business—especially where competition is keen.
3. The actual amount of deduction, where gas is sold on special percentage discount terms. On a 2s. 6d. nominal price, 10 p.ct. discount amounts to 3d. But as the price rises, the discount follows *pro ratâ*. On 5s., it would be 6d.

In circumstances too well known to need recapitulation, the current rates for gas are abnormally high; and the statutory rates of dividend are ridiculously and unreasonably low. The fact has been blatant for five years, that regulations supposed and intended to encourage and reward careful and skilled management, in practice have the effect of rendering the rate of dividend the sport of all sorts of fortuitous circumstances outside the industry. The momentary relief afforded by the Temporary Increase of Charges Act may be left out of consideration.

A diversion of reductions on any item of expenditure from their legitimate application as a means of reducing the nominal price of gas, accepts the present as a normal state of affairs, and tends towards making an impossible position a permanent one. But the gas industry needs, not perpetuation of the present hardships, but relief from them. Yet the Government is strong on the point that not one penny of the reduction in the price of coal shall go, either to the benefit of gas undertakings, or the removal of the numerous inflictions under which the industry is at present labouring. The fact that the gas undertakings are not called upon to distribute more than they receive may be urged as evidence of no direct loss, though the Coal Prices Order offers no prospect of relief from an unpassable predicament, but aggravates the position in many indirect ways.

Like most of the regulations enforced from outside the industry, the Order applies very unequally, and therefore unjustly. In one of the districts where 400 B.Th.U. gas is not only accepted without objection, but is hailed as an improvement on 550 B.Th.U., a sale of 20,000 c.ft. of gas per ton of coal carbonized may be possible, which means a rebate in the neighbourhood of 6d. per 1000. But in small, poor, straggling, or mining districts, where the flat-flame burner finds influential adherents, a sale of even half the quantity may be impracticable, and the rebate amounts to more than 1s. In some sense the amount of rebate follows the B.Th.U. of the gas. The better the quality, the larger the rebate.

Taking the rebates as ranging from 6d. to 1s. 4d. per 1000 c.ft., and the usual basis of 5s. p.ct. for every variation above or below the standard or initial price (or neutral zone if there is one), the statutory rate of dividend is reduced by the operation of the Order, to the extent of anything between 1¼ and 4 p.ct., according to geographical or other fortuitous circumstances. Remembering the protracted and costly legal quibbling that has taken place before Parliamentary Committees over comparatively unimportant issues, one is amazed that a Government Department outside the industry—not caring a fig for the interests of either consumer or producer, and without consulting either—can write-down the statutory rate of dividend to the extent of 4 p.ct.

That such powers endanger the existence of the industry may be shown by a simple example. A certain gas undertaking, subject to 10 p.ct. maximum on the original capital, and 7 p.ct. on the new capital, was selling gas at 3s. per 1000 c.ft. in 1914; but at present they cannot supply at less than 6s. Under the temporary shadow of the Relief Charges Order, it can pay 7½ and 5¼ p.ct., if able to earn enough. But under existing statutory enactments, the rates will be (respectively) £2 and £1 8s. If under the sliding-scale, the position will be worse, because an initial price is always lower than a standard price. If the rebate is 1s., the actual selling price to the bulk of the users would be 5s.—a figure that would admit of a 5 and 3¾ p.ct. dividend. This is sufficient to show that the nominal price of gas should be jealously preserved from outside interference.

During the past five years, many extensions have stood over on account of scarcity of materials and labour; and in regard to new business, gas undertakings will be at a disadvantage with gas priced at 6s., though actually sold at 5s. Prospective users will disregard the rebate as an uncertain quantity, and figure on the gross; and one need scarcely add that competitors will assuredly follow suit.

The connection between the question of discounts, a larger gross price, and a smaller net profit, is a more domestic matter. A common practice is to allow a discount to large users (such as railway companies) that may be agreed at 5, 10, or even 15 p.ct. With gas at 3s., this means 1·8d., 3·6d., and 5·4d. respectively. At the time of making these arrangements, the net revenue per 1000 c.ft. of gas sold was over 1s.; but in 1914 it was probably more like 10d. But to-day many undertakings do not earn 6d. per 1000 c.ft., and where the net revenue is less than the discount, the difference is an absolute loss—the rebate *cum* discount may amount to as much as 2s. per 1000 c.ft. Further, the discount will be calculated on the nominal and not on the sale price. So the large consumer may get a discount on 6s. although the actual selling price is 5s,, and may benefit, purely by the operation of the Coal Prices Order, to the extent of 2d. per 1000 c.ft.

Carbon Monoxide in Flames of Gases.

The "Journal of the Society of Chemical Industry" has abstracted an article appearing in the "Comptes Rendus" [Vol. CLIX., pp. 1404-6] by Messrs. Kling and Florentin, dealing with the production of carbon monoxide in the flames of gases. The authors burned a number of samples of gas—some industrial and some synthetic—containing from 0 to 60 p.ct. of carbon monoxide, in different types of burners in a large chamber; and at the end of an hour the carbon monoxide in the air was estimated. It is shown that the production of carbon monoxide is mainly due to any sudden cooling of the flame; and for a given type of burner it is practically independent of the amount originally present in the gas. The Auer burner produced comparatively large amounts of carbon monoxide; and it is shown that this is due mainly to the presence of the incandescent mantle. The hourly production of carbon monoxide with certain common types of burners is sufficiently high to warrant further efforts to improve them. The amount of carbon monoxide coming into the air by leakage from the piping, &c., of an interior supply having eleven taps, the gas containing 20 p.ct. of carbon monoxide, is much less than the amount produced in the same time by burning the gas in a small furnace or a small Auer burner.

Waste and Correct Use of Natural Gas.

Among the "Notes from the U.S. Bureau of Mines," published in the February issue of the "Journal of the Franklin Institute," was one on the above subject by Mr. S. S. Wyer. He wrote: Natural gas is a community asset, and every consumer has a right to demand that wasteful use be prohibited in the interest of the general service. Of all the gas sold as a public utility service in the United States, three-fourths is natural gas. The average price of natural gas to the domestic consumer is 30 c. per 1000 c.ft.; the average price of manufactured gas is $1.00 per 1000 c.ft. Of the natural gas delivered to the domestic consumer 80 p.ct. is wasted through the use of inefficient appliances for its burning. By relatively simple and inexpensive adjustments in such appliances, it is quite possible to make 1 c.ft. of gas do the work now done by 3 c.ft. This would make a gas supply available for consumers who are now unable to obtain any, and postpone the time when (through exhaustion of the natural supply) consumers will generally have to turn to the use of manufactured gas. Details as to the sources of waste in the use of natural gas in the home, and the means which should be adopted for their correction are given in a Technical Paper of the Bureau of Mines. A Conference called by the Secretary of the Interior met in Washington on Jan. 15, as a result of which a Committee of ten was appointed to take suitable steps to lessen this loss.

THE PRODUCTION OF AMMONIA AND AMMONIA COMPOUNDS DURING THE YEAR 1918, AT WORKS CARBONIZING OR GASIFYING COAL, SHALE, AND BONES.

By D. V. HOLLINGWORTH, F.I.C., F.C.S., and E. J. FOTTRELL, B.Sc., Assoc.M.Inst.C.E.

THIS statement has been drawn up from material placed at our disposal by the Ministry of Munitions (Department of Explosive Supply). The material is derived mainly from returns made to the department by manufacturers when it was endeavouring to increase the production of ammonia.

THE ammonia-producing works dealt with in this statement are:

SECTION A.—1. Gas-works manufacturing ammonia products.
" A.—2. " selling ammoniacal liquor.
" A.—3. " wasting ammoniacal liquor.
SECTION B.—Coke-ovens.
SECTION C.—Producer-gas plants.
SECTION D.—Blast-furnaces using coal as fuel.
SECTION E.—Shale-works.
SECTION F.—Bone-works.

Particulars are tabulated showing:

1.—The total number of works in each section.

2.—The quantity of wet and dry coal treated by each section, and the total quantity by all the sections, with particulars of the amount of moisture contained in the coal used therein.

3.—The number of works in each section where the following products are made, the quantity of products manufactured, and the quantity of coal consumed therein:

(*a*) Sulphate of ammonia.
(*b*) Concentrated ammonia liquor.
(*c*) Muriate of ammonia.
(*d*) Crude ammoniacal liquor (sold).
(*e*) Crude ammoniacal liquor (wasted).

4.—The total quantity of ammonia products made by each section—expressed as 25 p.ct.

5.—The yields of ammonia, stated in pounds of sulphate of ammonia (containing 25 p.ct. of ammonia) per ton of dry coal treated, obtained by the works in each section, with particulars showing the number of works in each section recovering certain stated quantities of ammonia.

6.—The relation of period of year to consumption of coal and production of ammonia compounds at gas-works.

It should be noted that the particulars given will necessarily be of the same order of accuracy as the information supplied to the department by manufacturers in the monthly returns. The yields of ammonia have been checked by the stated monthly records of stocks of sulphate and other compounds of ammonia.

The period covered by this statement—namely, from Jan. 1 to Dec. 31, 1918, was an abnormal one. The coal supplied to the various ammonia-producing industries was undoubtedly considerably inferior to that supplied before the war; and this, of course, had a direct influence on the yield of ammonia products. It may be accepted that the impurities present in the coal treated during 1918 were certainly more by 10 p.ct. than in that of the pre-war periods.

The nature of the respective ammonia products made has also been entirely dependent on the frequently changing needs of such products required for explosives purposes; and the quantity of these products manufactured has no similarity to the normal pre-war and post-war requirements of the country.

For example, whereas in the early part of the year the principal demand was for commercial pure concentrated ammonia liquor, the alteration in the method of manufacture of ammonium nitrate, and later, the consummation of the armistice in November, and the consequent cessation of ammonium nitrate manufacture, necessitated also closing-down many concentrated liquor-making plants, and the proportionate increase in sulphate manufacture.

Where comment has been made in the following pages on the yields obtained, and on the factors influencing them, it has been done with the view of drawing attention to the great possibilities of improvement, but with full cognizance and acknowledgment of the immense difficulties that war-time conditions have imposed upon works managers. It is recognized that depleted staffs, lack of skilled supervision, inadequate supplies, and inferior quality of coal, and the impossibility of securing renewal of parts, have frequently prevented the efficient working of plant, with consequent loss of ammonia.

It will be observed that the following statistics refer to Great Britain only—the returns from Ireland being insufficiently reliable to warrant inclusion herein. It may, however, be stated that the approximate quantity of wet coal treated in the whole of the Irish gas-works was 336,000 tons; and the ammonia produced therefrom, expressed as 25 p.ct. sulphate, was 2632 tons.

SECTION A 1.

GAS-WORKS (GREAT BRITAIN) WORKING-UP AMMONIA TO PRODUCTS.

Total number of gas companies and corporations from whom returns have been received 425

Total Quantity of Coal Carbonized in 1918.

Dry coal	11,371,015 tons
Wet coal as carbonized	12,032,225 "
Average percentage of moisture in coal as carbonized	5·49 p.ct.

With a view to obtaining a common standard for comparison, it was thought desirable to ascertain the amount of moisture in the coal as carbonized in the various industries. It was found, however, that at but few gas-works was the moisture in coal regularly estimated. It was difficult, therefore, to get accurate information on this point. Where systematic records were taken, the average moisture content was as stated—*i.e.*, 5·49 p.ct.—and this figure has been used for the purpose of calculating the dry coal employed. In the case of the smaller gas-works selling or wasting their liquor, it was found that 4 p.ct. of moisture more nearly represented the facts.

Quantity of Ammonia Recovered.

Total quantity of ammonia and products recovered, expressed as 25 p.ct. sulphate of ammonia.	113,534 tons
Average yield of ammonia, expressed as pounds of 25 p.ct. of sulphate of ammonia per ton of dry coal carbonized.	22·42 lbs.
Average yield at individual works	18·4 "

It will have been observed that the average yield of ammonia obtained per ton of dry coal carbonized—*i.e.*, the total production of ammonia products in pounds, divided by the total quantity of dry coal in tons, is considerably higher than the average yield at individual works.

The conclusion to be drawn from this is that the larger works, with probably better facilities as regards plant and supervision, are obtaining better yields than the smaller ones.

Number of Gas-Works recovering Stated Quantities of Ammonia.

Results are expressed as pounds of sulphate of ammonia (25 p.ct.) recovered per ton of dry coal carbonized, and show the average of twelve monthly records.

Ammonia Recovered.	Number of Works.	Wet Coal Carbonized. Tons.
Between 40 and 45 lbs.	2	14,228
" 35 " 40 "	3	32,766
" 30 " 35 "	12	623,328
" 25 " 30 "	41	2,492,311
" 20 " 25 "	119	3,984,768
" 15 " 20 "	119	2,835,001
" 10 " 15 "	98	1,714,941
" 5 " 10 "	28	322,481
Below 5 lbs.	4	12,401

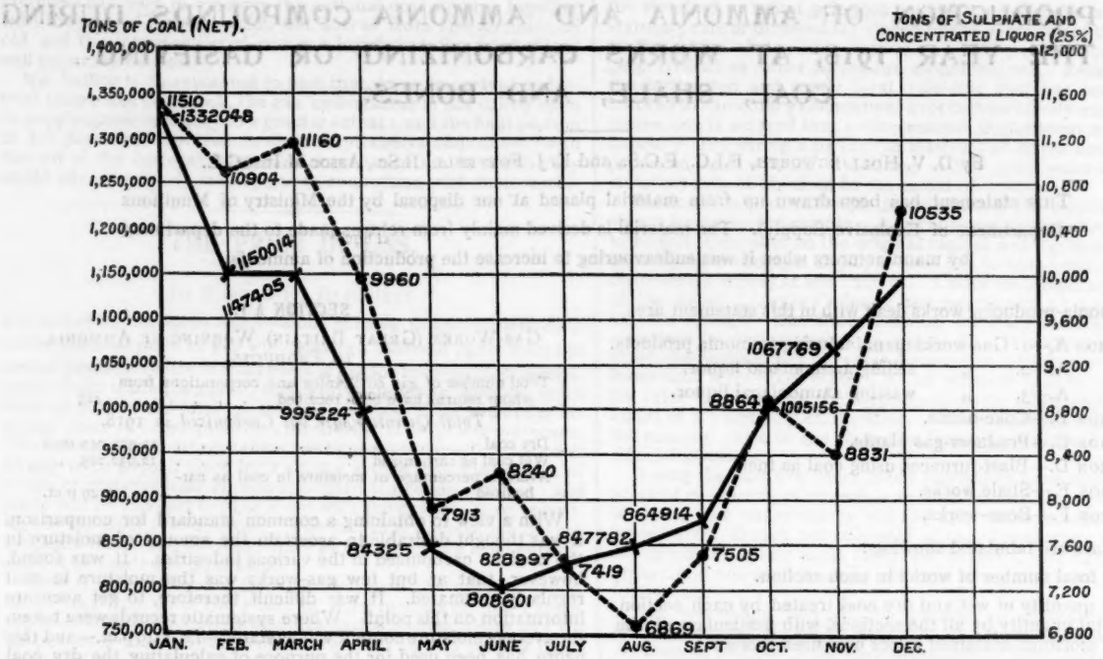
Highest average yield for the year	43·0 lbs.
Lowest average yield for the year	3·7 "

Having regard to the statement of yields at the various gas-works, it cannot be said that the recovery of ammonia is satisfactory; and while full praise may be given to the 177 works obtaining more than 20 lbs. to the ton (and especially to those making upwards of 30 lbs.), it is but just to draw attention to the enormous loss of ammonia which must be taking place at the 249 works producing less than the equivalent of 20 lbs. of sulphate to the ton—especially as at these works nearly 5 million tons of wet coal are annually consumed. In the light of these facts, the opinion may be hazarded that, in the greater conservation of ammonia, the gas industry has available a considerable source of revenue comparatively easy of attainment.

As contributory causes of the low yields at certain gas-works, the following may be mentioned:

1. The general disregard of the yields of ammonia at the smaller works.
2. Losses by evaporation from hot liquor in open wells, from seal-pots, and from streams of liquor falling into wells, tanks, &c. Also from concentrated liquor storage tanks.
3. Loss of ammonia in waste liquor from sulphate plants, &c., through lack of sufficient chemical supervision.

The almost general practice of not taking stock of liquor, or calculating yields, except at long intervals, whereby losses of ammonia are not apparent until too late to remedy them, is one to be strongly condemned. Wherever possible, stocks and yields of all products should be ascertained at least once per month.



Graphs showing the Variation in the Monthly Consumption of Coal and the Monthly Production of Sulphate of Ammonia and Concentrated Liquor—expressed in Terms of 25 p.ct. Sulphate of Ammonia—at Gas-Works (Section A1) during the Year 1918.

Number of Works at Dates Stated Manufacturing the Following Ammonia Products, with Total Production of Same for the Year, and the Total Quantity of Coal used at Works producing them.

—	Number of Works.		Quantity made during 1918.	Quantity of Coal consumed in 1918 in the Manufacture of the Product.
	At June 30, 1918.	At Dec. 31, 1918.	Tons.	Tons.
Sulphate of ammonia. .	408*	415†	72,734	7,897,395
Concentrated ammonia liquor	27*	23†	35,168	4,134,830
Muriate of ammonia . .	1‡	1‡	12	Included in above
Nitrate of ammonia . .	1‡	1‡	293	do.
Crude ammoniacal liquor sold	—	—	55,339§	do.
Increase in stock of ammoniacal liquor between Jan. 1, 1918, and Dec. 31, 1918	—	—	8,032§	do.

* Ten of these works in each case make both sulphate of ammonia and concentrated liquor.
† Thirteen of these works in each case make both sulphate of ammonia and concentrated liquor.
‡ Muriate or nitrate is made at these works, in addition to other ammonia products.
§ Tons of liquor, 10-oz. strength.

The high proportion of concentrated ammonia liquor made at so small a number of works is accounted for by the fact that several of the largest gas-works in the country are making this product—four works alone being producers of concentrated liquor to the extent of 20,928 tons per annum.

The relationship between the quantity of coal carbonized and the ammonia products made is not so close as might be expected. This is probably due to the practice of accumulating stocks of liquor during the period of maximum production and working this up in the summer months.

No doubt advantage was taken of the slack period between the completion of the working-up of stocks and the beginning of the busier season of the year to effect necessary repairs to sulphate and other plant. Hence the low production of ammonia products during August and September.

SECTION A 2.

Gas-Works (Great Britain) Selling Ammoniacal Liquor Produced.

Total number of companies and corporations from whom returns have been received . .	At June 30, 1918	704
	At Dec. 31, 1918	823
Total quantity of coal carbonized at such gas-works . .	For six months to June 30, 1918	2,276,161 tons
	For six months to Dec. 31, 1918	2,314,260 ,,
Total quantity of ammoniacal liquor (10-oz. strength) produced	For six months to June 30, 1918	56,546,366 gallons = 259,387 tons
	For six months to Dec. 31, 1918	57,872,024 gallons = 265,468 tons
Yield of ammoniacal liquor (10-oz. strength) per ton of coal carbonized		25 gallons 22·2 lbs. (25 p.ct. sulphate of ammonia)

It should be noted that the yields of ammonia at works where sulphate of ammonia and concentrated liquor are manufactured are based on the quantity of such products made, and do not include therefore the losses of ammonia connected with the processes of manufacture, whereas the yields at works selling their liquor are based on the actual quantity of crude liquor produced. The fact that the yields at the former works are higher than those where the liquor is not worked up, indicates some lack of efficiency in recovery at the latter works. As these works are generally small, the low efficiency is probably due to insufficient technical supervision and inadequate plant.

SECTION A 3.

Gas-Works (Great Britain) Wasting Ammoniacal Liquor Produced.

Total number of companies and corporations from whom returns have been received .	At June 30, 1918	336
	At Dec. 31, 1918	217
Total quantity of coal carbonized at such gas-works . .	For six months, to June 30, 1918	67,894 tons
	For six months, to Dec. 31, 1918	28,266 ,,
Total quantity of ammoniacal liquor (10-oz. strength) . .	For six months, to June 30, 1918	1,271,000 gallons = 5,830 tons
	For six months, to Dec. 31, 1918	706,066 gallons = 3,239 tons

Reference to Sections A 2 and A 3 shows that at the beginning of 1918 there were 336 gas-works carbonizing together 135,000 tons of coal per annum, which were wasting the whole of the ammoniacal liquor produced. This number was reduced by the end of the year to 217—facilities being given to the remainder to dispose profitably of their liquor.

GAS-WORKS.—SUMMARY OF SECTIONS A 1, A 2, A 3.

	Dry Coal Carbonized.	Total Coal Carbonized at Gas-Works.
Section A 1 . . . . . Gas-works manufacturing ammonia products.	11,371,015 tons	71·65 p.ct.
*Section A 2 . . . . . Gas-works selling ammonia liquor.	4,406,805 ,,	27·76 ,,
*Section A 3 . . . . . Gas-works wasting ammonia liquor.	92,314 ,,	0·59 ,,
	15,870,134 tons	

Section A 1.

Ammonia and products recovered (expressed as 25 p.ct. sulphate of ammonia)	113,534 tons

Section A 2.

Crude ammonia liquor recovered and sold (expressed as 25 p.ct.)	45,494 ,,

Section A 3.

Crude ammonia liquor wasted (expressed as 25 p.ct.)	786 ,,
Total quantity of ammonia produced (expressed as 25 p.ct.)	159,814 tons
Total quantity recovered	159,028 ,,

* An average of 4 p.ct. of moisture has been assumed.

SECTION B.—BYE-PRODUCT COKE-OVENS.

Total number of coke-works from which returns have been received 116*
Total number of bye-product coking plants in operation at Dec. 31, 1918 113
Total quantity of coal carbonized at coke-works:
Dry coal. . . . . 13,550,329 tons
Wet coal carbonized . . . . . 15,030,443 ,,
Average percentage of moisture in coal as carbonized . . . . . 9·8 p.c.

* One low-temperature carbonizing works not included. One not now working not included.

Number of Works at Dates stated Manufacturing the Following Ammonia Products, with Total Production of Same for Year and Total Quantity of Coal used at Works producing them.

—	Number of Works.		Quantity Made During 1918.	Quantity of Coal Consumed in 1918.
	At June 30, 1918.	At Dec. 31, 1918.	Tons.	Tons.
Sulphate of ammonia. .	102*	109†	133,080	13,110,423
Concentrated ammonia liquor	19*	19†	21,839	1,793,592
Muriate of ammonia . .	8‡	8‡	345	Included above.
Nitrate of ammonia . .	*Nil*	*Nil*	..	..
Crude ammoniacal liquor (sold)	2	2	26,979§	126,428
Crude ammoniacal liquor (wasted)	*Nil*	*Nil*	*Nil*	*Nil*

* Seven of these works in each case make both sulphate of ammonia and concentrated liquor. † Fourteen of these works in each case make both sulphate of ammonia and concentrated liquor. ‡ Muriate is made at these works in addition to sulphate of ammonia. § Tons of liquor of 10-oz. strength.

Total quantity of ammonia products made, expressed as 25 p.ct. sulphate of ammonia . . . 157,663 tons
Quantity of ammonia recovered—
Average yield of ammonia at all works, expressed as pounds of 25 p.ct. sulphate of ammonia per ton of dry coal carbonized . . . . . 26·1 lbs.
Average yield at individual works . . . . . 27·1 lbs.

In explanation of the fact that the average yield of ammonia at individual works was greater than the average yield per ton of coal carbonized, it may be stated that some of the larger coking installations are situated in localities where the coal mined is low in nitrogen.

Number of Coke-Works recovering Stated Quantities of Ammonia.

Results are expressed as pounds of sulphate of ammonia (25 p.ct.) recovered per ton of dry coal carbonized, and show the average of twelve monthly records.

Ammonia Recovered.	Number of Works.	Wet Coal Carbonized.
Between 40 and 45 lbs. ..	1 ..	92,832 tons
,, 35 ,, 40 ,, ..	3 ..	239,773 ,,
,, 30 ,, 35 ,, ..	36 ..	4,061,200 ,,
,, 25 ,, 30 ,, ..	36 ..	4,200,304 ,,
,, 20 ,, 25 ,, ..	33 ..	5,430,369 ,,
,, 15 ,, 20 ,, ..	5 ..	616,003 ,,
,, 10 ,, 15 ,, ..	2 ..	389,962 ,,
,, 5 ,, 10 ,, ..	*Nil* ..	*Nil*
Below 5 lbs. ..	*Nil* ..	*Nil*
Highest average yield for the year		40 lbs.
Lowest ,, ,, ,, ...		13·7 ,,

A comparison of the yields of ammonia obtained in the gas and coking industries (22·42 lbs. and 26·1 lbs. respectively) is distinctly favourable towards the latter.

While there are many well-known factors influencing these results, it would seem that the more general use of a washed coal in coke-ovens is amongst the most important. Not only does the washing result in the preparation of a cleaner coal, the use of which in the manufacture of metallurgical coke is almost a necessity, but the carbonization of the wet coal undoubtedly gives a larger yield of ammonia because of the protective action of the steam evolved. This is borne out by the results obtained in both gas producers and shale-oil retorts, where steam is actually passed into the heating chambers.

Relation of the Period of the Year to the Consumption of Coal and the Production of Ammonia expressed as 25 p.ct. at Coke-Works.

—	Jan.	Feb.	March.	April.	May.	June.
Tons of coal (wet)	1,290,733	1,203,809	1,289,457	1,266,556	1,307,096	1,243,833
Sulphate of ammonia *plus* concentrated liquor (including receipts) . . .	12,782	10,993	13,224	13,631	14,120	13,539

—	July.	August.	Sept.	Oct.	Nov.	Dec.
Tons of coal (wet)	1,208,861	1,265,762	1,251,637	1,308,882	1,193,130	1,200,678
Sulphate of ammonia *plus* concentrated liquor (including receipts of liquor from any other source) . . .	12,942	13,219	13,233	13,735	12,310	12,429

	Total.
Tons of wet coal	15,030,434
Sulphate of ammonia *plus* concentrated liquor .	156,157

SECTION C. PRODUCER GAS PLANTS. (Ammonia Recovery.)

Total number of producer gas plants having ammonia recovery system, rom which returns have been received 25

Total quantity of coal gasified during 1918—
Dry coal . . . . . 817,442 tons
Wet coal as gasified . . . . . 893,502 ,,
Average percentage of moisture in coal as gasified . . . . . 8·51 p.ct.

Total quantity of products made—
Sulphate of ammonia . . . . . 21,626 tons
Muriate of ammonia . . . . . 32 ,,
*Crude ammoniacal liquor sold (stated as 25 p.ct.) 582 ,,
Total quantity of ammonia products made, expressed as 25 p.ct. ammonia sulphate . . . . . 22,245 ,,

Quantity of ammonia recovered—
Average yield of ammonia at all works, expressed as pounds of 25 p.ct. sulphate of ammonia per ton of dry coal gasified. . . . . 60·96 lbs.
Average yield at individual plants . . . . . 61·8 ,,

* Containing some muriate of ammonia.

Number of Producer Plants recovering Stated Quantities of Ammonia.

Results are expressed as pounds of sulphate of ammonia (25 p.ct.) recovered per ton of dry coal gasified, and show the average of twelve monthly records.

Ammonia Recovered.	Number of Works.	Wet Coal Gasified during Twelve Months. Tons.
Between 100 and 110 lbs. ..	2 ..	33,170
,, 90 ,, 100 ,, ..	1 ..	60,812
,, 80 ,, 90 ,, ..	1 ..	63,757
,, 70 ,, 80 ,, ..	4 ..	98,060
,, 60 ,, 70 ,, ..	6 ..	349,235
,, 50 ,, 60 ,, ..	1 ..	7,498
,, 40 ,, 50 ,, ..	5 ..	132,603
,, 30 ,, 40 ,, ..	2 ..	7,635
,, 20 ,, 30 ,, ..	2 ..	70,732
,, 10 ,, 20 ,, ..	0 ..	*Nil*
Below 10 lbs.	1 ..	68,000
Highest average yield for the year		108 lbs.
Lowest ,, ,, ,, ...		9·5 ,,

From the above figures it will be apparent that the yields of ammonia from producer gas plants vary considerably at the different works. In most cases this variation is due to the varying quantities of steam employed in the producers, and the degree to which they are pressed in working. Where the producer gas is used for heating purposes, and a moderate calorific value will suffice, the maximum quantity of steam is employed and the maximum quantity of ammonia is produced. Conversely, where the working of the producers is pushed to the full limit of their capacity, or where a high calorific value is considered essential (as in metal melting, &c.), the consumption of steam is reduced, and a lower yield of ammonia obtained.

It may be stated that at one of the works where the highest yields of ammonia are obtained, it is the practice to add to the coal, prior to its gasification, a proportion of slaked lime.

Relation of the Period of the Year to Consumption of Coal and the Production of Ammonia expressed as 25 p.ct. at Producer Plants.

—	Jan.	Feb.	March.	April.	May.	June.
Tons of coal (wet) .	66,908	70,979	79,902	79,789	77,290	77,493
Sulphate of ammonia *plus* concentrated liquor	1,688	1,790	2,022	2,015	2,052	1,949

—	July.	August.	Sept.	Oct.	Nov.	Dec.
Tons of coal (wet) .	64,566	71,312	77,195	86,683	73,703	67,582
Sulphate of ammonia *plus* concentrated liquor	1,514	1,715	1,869	1,907	1,593	1,512

	Total.
Tons of coal (wet)	893,502
Sulphate of ammonia *plus* concentrated liquor	21,626

The quantity of coal required to produce a ton of sulphate of ammonia appears from the above tables to show an increase during the second half of the year. It is probable that this is due to the inferior quality of the coal supplied.

SECTION D. BLAST FURNACES USING COAL AS FUEL.

Total number of blast furnaces from which returns have been received 9

Total quantity of coal gasified in blast furnaces—
Dry coal . . . . . 1,008,200 tons
Wet coal as gasified. . . . . 1,050,760 ,,
Average percentage of moisture in coal as gasified . . . . . 4·05 p.ct.
Total quantity of sulphate of ammonia made, expressed as 25 p.ct. . . . . 9·389 ,,
Average yield of ammonia at all works, expressed as pounds of 25 p.ct. sulphate of ammonia per ton of dry coal gasified . . . . . 20·9 lbs.
Average yield at individual works . . . . . 21·9 ,,

Number of Blast-Furnaces recovering Stated Quantities of Ammonia.

Results are expressed as pounds of sulphate of ammonia (25 p.ct.) recovered per ton of dry coal gasified, and show the average of twelve monthly records.

Amount Recovered.	Number of Works.	Wet Coal Gasified During Twelve Months.
Between 25 and 30 lbs.	1	67,014
,, 20 ,, 25 ,,	6	742,645
,, 15 ,, 20 ,,	2	241,102

SECTION E. SHALE WORKS (SCOTLAND).

Total number of companies from whom returns have been received	7
Total quantity of shale carbonized—	
Dry shale	3,155,000 tons
Wet shale as carbonized	3,246,819 ,,
Average percentage of moisture in shale as carbonized	2·82 p.ct.
Total quantity of products made—	
Sulphate of ammonia (as 25 p.ct.)	44,032 tons
Concentrated ammonia liquor (as 25 p.ct.)	14,160 ,,
Total	58,192 ,,
Quantity of ammonia recovered—	
Average yield of ammonia at all works, expressed as pounds of 25 p.ct. sulphate of ammonia per ton of dry shale carbonized	40·1 lbs.
Highest individual yield of ammonia	52 ,,
Lowest ,, ,, ,,	29·6 ,,

SECTION F. BONE WORKS.

Total number of companies from whom returns have been received	4
Total quantity of bones carbonized (dry)	12,790 tons
Total quantity of sulphate of ammonia made	455 ,,
Quantity of ammonia recovered per ton of dry bones carbonized, expressed as 25 p.ct.	80 lbs.

SUMMARY OF AMMONIA STATISTICS.

Quantity of Coal Treated and Ammonia Products made in Various Industries (expressed as 25 p.ct. Sulphate of Ammonia).

—	Dry Coal Carbonized. Tons.	Total Ammonia Recovered Tons of 25 p.ct.	Yield of Ammonia (25 p.ct.). Pounds per Ton of Dry Coal.
Gas-works	15,870,134	159,028	22·4
Coke-ovens (bye-product)	13,550,329	157,663	26·10
Producer gas plants	817,442	22,245	60·96
Blast furnaces	1.008,200	9,389	20·9
Totals for 1918	31,246,105	348,325	Aver. 25·02

Quantity of Certain Ammonia Products Made in Various Industries—all expressed in terms of 25 p.ct.

—	Sulphate of Ammonia. Tons.	Concentrated Ammonia Liquor. 25 p.ct.	Muriate of Ammonia. Tons.	Nitrate of Ammonia. Tons.	Crude Ammonia Liquor (Sold). Tons.
Gas-works	72,734	35,168	15	142	55,969*†
Coke-ovens	133,080	21,839	413	..	4,331†
Producer gas plants	21,626	..	38	..	582
Blast furnaces	9,389	..	..	..	..
Shale-works	44,032	14,160	..	..	..
Bone-works	455	..	..	..	..
Totals	281,316	71,167	466	142	60,882

* Includes 694 tons increase in ammoniacal liquor stocks.

† In these figures, allowance has been made for the ammonia content of the tar sold by these works, and appearing in the finished ammonia products of the purchasers.

Total Quantity of all Ammonia Products Made, expressed as 25 p.ct. Sulphate of Ammonia.

From treatment of coal	355,325 tons
,, ,, shale	58,192 ,,
,, ,, bones	455 ,,
	413,972 tons

At a meeting of the Midland Junior Gas Association on Thursday evening of this week, Mr. T. F. E. Rhead, M.Sc., of Birmingham, will lecture, with experiments and lantern slides, on "Gas and Coal Dust Explosions."

In their annual report, the Committee of the Midland Association of Gas Engineers and Managers refer with sincere regret to the death of the late Mr. William North, formerly of Stourbridge, who was one of the founders of the Association. They point out that Mr. North was one of five gentlemen who met at the Windsor Street Gas-Works, Birmingham, on Sept. 20, 1877, when it was decided to issue invitations to the managers in the Midlands to attend a meeting for the purpose of forming a District Association of Gas Managers. He later acted for a period of seven years as Hon. Secretary of the Association, in which he always took an active interest until he left the district.

JOINT SCOTTISH JUNIOR GAS ASSOCIATION MEETING.

Visit to Messrs. R. & A. Main's Gothic Iron Works, Falkirk.

On Saturday last, the Scottish Junior Gas Associations (Eastern and Western Districts) held their annual joint visit. This year, the Gothic Iron-Works of Messrs. R. & A. Main, at Falkirk, were visited. The members present, numbering about 120, were cordially received, and were shown round by members of the staff.

The works, which cover an area of over 4 acres, are lit by electricity. Messrs. Main very kindly kept some of their plant running in each department for the benefit of the visitors. Much interest was displayed in the methods adopted for treating the various castings of gas and other appliances after leaving the moulding shop. Starting in the pattern shop, where the initial stages of the construction of appliances and new designs of gas-fires not yet on the market were seen, the visitors passed through the pattern store (where all patterns are carefully kept) to the moulding shop. This is capable of turning out about 40 tons of castings daily. At one end of the department two cupolas for melting iron are situated. The castings, on leaving the moulding shop, are taken to the dressing shop for trimming and dressing up. They are next handed over to the passer, who carefully examines them for flaws. The grinding mill, which is adjacent to the dressing shop, also serves as the polishing department for all castings requiring to be so treated. In the smithy, the malleable iron used in the manufacture of gas-stoves is handled. Here also the parts for all types of cooker grid shelves and gate fittings are cut, folded, punched, and riveted together. All castings requiring drilling and boring are dealt with in the boring shop.

The fitting shop is divided into three sections—the light and heavy fitting shops, where the assembling of all stove work (large and small) takes place, and the sheet-iron shop, which is devoted to sheet-iron work and the making of tin-ware for cookers.

The visitors were much impressed by the electric and the acetylene welding work done by female labour. Also great interest was evinced in the new type of grid burner, "coneless flame," which has been adopted for Messrs. Main's cookers. With this type of burner, a small thin metal plate, raised about $\frac{3}{16}$ in. from the surface of the grids, is secured, and the super-aerated mixture of gas and air burns on the surface of the grids underneath the plate, making the plate red hot—any excess of flame burning round the slot between the plate and the burner. A very interesting exhibit was a gas-fire that burns with an absolutely noiseless flame, the burner of which is guaranteed not to light-back. The effect is obtained by using strips of thin sheet iron—one piece plain on both sides between two strips corrugated on both sides. The mixture of gas and air passing through the small tubes formed by the corrugations has all the eddy currents straightened out, and reaches the point of ignition in a noiseless state.

During the war, the Company did a large amount of war work; and an exhibition of the articles made by them was much appreciated by the visitors. Cooking and heating appliances were their principal manufactures during the first twelve months of the war; but towards the end of 1915, when the cry for munitions became more and more insistent, they turned their attention to the manufacture of implements of warfare. To enable them to undertake this work, they had to remodel their works; and under great difficulties a machine shop was installed and equipped with almost entirely unskilled labour. They were one of the first firms to introduce female labour. As a result, about 390 girls were employed out of a total of 700 workpeople. The aggregate total of different varieties of bombs, shells, and accessories turned out by them during the whole war period was 3,000,000. This was equal to an average weekly output of 20,000 articles—a very creditable achievement for a firm that prior to the war had never had a lathe in their premises. The process of reverting to normal work has been rather difficult and laborious; but the lessons learnt during the war have not been forgotten, and will be brought to bear in the manufacture of modern gas cooking and heating appliances.

THE VISITORS AT TEA.

At the conclusion of the visit, the party were entertained at high tea in the Camelon Gymnasium, near the works. Mr. A. P. Main, the Vice-Chairman, and Mr. Kenneth Aird, the Managing Director of Messrs. Main were present.

Mr. MAIN, who had journeyed specially from London for the visit, said that it gave his firm the greatest of pleasure to have the Junior Associations visiting their works, as the visit appealed to them as much as to the members. Some interesting processes had been shown them; and he was sure their staff of men and women who had given up their Saturday afternoon to run certain sections of the plant must have felt greatly encouraged by the inspection and appreciation of their work. He had been thinking over his experiences of the last forty years in the gas business, and the marvellous developments that had taken place within the last twelve years; and it made him almost envy the younger men their youth and the profession they represented, because he felt that within the next generation would be witnessed enormous and important developments in the great industry to which they were all attached. He was greatly impressed by a remark made recently in Manchester by the Chairman of the Gas Committee, that the gas engineer should have imagination as well as scientific training. In these days, he thought every man who had imagination must be con-

scious of the tremendous possibilities that lay before him in his career. It was a great happiness for him to be present, as he loved to be in the society of young men. In proposing the toast of the Junior Association, he coupled with it the names of the Presidents of the Eastern and Western Districts.

Mr. FARQUHAR (President of the Eastern District), in responding to the toast, said they welcomed the opportunity of meeting with the Western District. It would be a step in the right direction if the two Associations could find more opportunities for meeting together, not only at visits, but at meetings where they would be able to express their views on different problems affecting the industry. They had spent a very enjoyable and instructive afternoon, and had been shown many novelties and new features in cooking and heating appliances. He thanked Messrs. Main on behalf of his Association.

Mr. DICKSON (President of the Western District), who associated himself with the remarks of Mr. Farquhar, expressed, on behalf of the Western District, the thanks of the members for the very hearty welcome extended to them by Messrs. Main, and for their hospitality. He agreed with Mr. Farquhar that the joint visits of the two Associations gave opportunities for social intercourse and an exchange of views which could not otherwise be obtained. All that they had seen that day would add to the knowledge of the visitors; and would give them a more intelligible idea how to use the various appliances. If the ordinary gas consumer could have seen all that had been provided for the benefit of the Association by Messrs. Main, many of their difficulties would be solved. He called for a hearty vote of thanks to Mr. Main and to the members of the staff, and also the employees who had so willingly given up their Saturday afternoon for the enjoyment of the Associations.

Mr. AIRD said he would be voicing the opinion of the members of the firm in saying that the visit had been a great pleasure to them as manufacturers. They had had a very hard time of it on war work; and it had been a difficult struggle to get back to their ordinary business. As manufacturers, they were suffering on account of the high prices of materials. Some people were inclined to think of them as profiteers, and that they were backward in deliveries; but they had many difficulties to face. The actual increase on their catalogue prices was not much more than 100 p.ct.; whereas their cost had increased more than 200 p.ct. They were paying exceptionally high prices for pig-iron as compared with pre-war days; sheet-iron had gone up 500 p.ct.; while other materials had risen in the same proportion.

SCOTTISH JUNIOR GAS ASSOCIATION.

(WESTERN DISTRICT.)

As was mentioned in the "JOURNAL" at the time, the principal business at the February meeting of the Association—which was held in Glasgow, under the presidency of Mr. JAMES DICKSON—was a paper, illustrated with lantern slides and diagrams, by Mr. JOHN M'INTYRE, of the Gas Department, Glasgow.

GAS-ENGINE WORKING.

Mr. M'Intyre began by pointing out some of the more important dates and facts connected with the history of the internal combustion engine; and he then went on to emphasize the fact that the main points common to all gas-engines are reliability, efficiency, simplicity, and economy. After a general description of the modern gas-engine and examining some of its details, he made the following remarks on the subject of working.

First, we should remember not to make a practice of overloading our engine. We must endeavour to form a fair estimate of the power required, allow a little margin, and select an engine capable of giving out this power at about 80 p.ct. of the makers' test brake horse power.

Side shaft brackets are better all on the cylinder proper, as then we can obtain better alignment. Further, it is a great convenience to be able to remove the combustion head without disturbing the side shaft and its gear. This gear ought to be regularly examined; and some little work would be well spent occasionally in the way of grinding-in the air and exhaust valves, thus ensuring that they are always kept tight.

The entrance to the cooling water passages should be kept clear, and the water be free from dirt or any foreign matter likely to help on internal corrosion. In some cases where only dirty water, or water at a lower level than the engine, is obtainable, a small rotary pump driven from the side-shaft and connected to the cooling system often does good service. However, if we have to rely on thermo-syphon cooling alone, it would be well to observe the following: Have the tanks of reasonable dimensions; bottom of tank not lower than top of cylinder; return water-pipe to rise vertically from the top of the cylinder and enter near the top of the tank; cold water inlet supply to the tanks to be led to the bottom of the tanks by means of a division plate or pipe; take connection to the under side of the cylinder from the position of coldest water—*i.e.*, bottom of tank. If, however, a battery of tanks is required, it is best to give the water as easy a route as possible. Care should also be taken to drain the cylinder jackets, when standing in cold weather, to prevent damage due to frost. Some prefer to add a quantity of sodium carbonate or a percentage of glycerine to the water to lower the freezing point. This is quite good for a small engine in an exposed place, but in larger units it becomes a somewhat expensive item.

Lubrication should receive some notice. Care should be taken to wash out bearings and outer rubbing surfaces occasionally with paraffin, and then apply a fair amount of lubricating oil. There are now several simple, yet efficient, forced oil-feeds to the piston on the market. It would be well to adopt one or other of these; and an automatic drip oiler ought to be used for the cross-head pin, as this is a part which is almost impossible to oil while running—in fact, modern engines are now fitted with a system of forced lubrication to all important parts as well as the piston. Gas-engine oil only, having a high flash-point, should be used in the cylinder, and a good quality of heavy machinery oil elsewhere. It is desirable to fit to the bottom of the cylinder a waste-oil blow-off, whereby any collection of oil or residue can be blown out when the engine is working, and it is still hot enough to flow readily from the cylinder.

Regular inspection should be insisted upon for all the various detail gear. For example, if there is a dual magneto ignition, a breaker switch inserted in the wire from each would enable us to ascertain if No. 1 or No. 2 magneto is out of order. This would occupy only a minute or so, and might be tested each day. It certainly ought not to be left, as in some cases with No. 1 magneto broken down, only to be discovered some months after when by some chance No. 2 happens to give out, as hereby we lose all the benefit of freedom from complete stoppage claimed for dual ignition.

Valves should be tried regularly. If these do not appear satisfactory, they must be cleaned and, if necessary, ground tight to their seatings. If a hissing sound and occasional smoke indicate loss of compression past the piston, this must be attended to at once. A new ring on the piston may help matters. When the engine has been at work for a number of years, the piston or the liner may be much worn. This is a more serious matter, and calls for renewal. Often these replacements cannot be had at a moment's notice; but the inconvenience of the engine developing less power may be somewhat minimized by inserting a liner, $\frac{1}{16}$ in. in small engines and $\frac{1}{8}$ in. in larger ones, between the big end of the connecting rod and the crank-pin bush, thereby reducing the clearance volume and increasing the compression pressure a little to compensate for the leakage past the piston. It must be noted, however, that this remedy is of a temporary and makeshift character, and can only be indulged in within narrow limits. Excessive wear as just described may be caused by dirt or grit getting into the cylinder when the engine is standing, if the engine-room is draughty; so a point should be made, on stopping, of always turning the flywheel till the crank is on its outer dead-centre ready to begin the compression stroke. The reason for this is that all valves are closed at this point; thus protecting the cylinder from dirt or grit of any kind entering.

A starting valve is a prominent feature nowadays, but is not an actual necessity. It would, however, be well to fit one to engines of 20 H.P. and upwards. There are two main types. One is the hand pump, where the mixture of gas and air is pumped into the cylinder and ignited; the other is a special starting and charging valve, opened when stopping the engine after the gas is turned off, thereby compressing air into a receiver. This air is again admitted to the cylinder next time it is desired to start-up. The special valve can also be used as relief when turning the engine by hand. Some makers also fit a cup, whereby benzol or petrol can be run into the cylinder and sparked-off; thus enabling a start to be made when for any reason there is no compressed air in the receiver.

Pipe connections, both exhaust and supply, should be of ample size, and as free from kinks or sharp turns as the circumstances will permit. The capacity of the bag or anti-fluctuator, whose duty is to protect adjoining apparatus from the effect of the engine's suction stroke, ought to be such that it can supply sufficient gas for two or three explosions. Then we may hope for it to do its work properly.

Much dissatisfaction has been caused of recent times in regard to gas-engine running, owing, no doubt, to the war-time gas supply, not so much on account of the reduction of calorific value as the variation in composition accruing from the erratic coal supply of indifferent quality and the fluctuating pressure rendered necessary by the scarcity of gas. So the two main ideals at which gas concerns must aim are unvarying composition of the gas with steady calorific power (even though low), and, secondly, constancy of the supply pressure diagram. The first requirement will be easy of attainment when decontrol of coal supplies comes, and gas undertakings are again allowed to select their coals and obtain supplies as far as possible always from the same localities. The second item does not permit of easy solution; but no doubt the trouble is aggravated by our present system of distribution at ordinary pressures direct from the holder. This is amply justified by the fact that in winter we are subject to faulty pressure not only during a dense fog, but also for some weeks after, owing to the quantity in stock being a governing factor in the supply pressure. If the system which looks likely to gain favour—of delivering gas from the works at high pressure by boosters, and feeding the low-pressure main at different points—were in use, it would alleviate trouble to the extent that, after the fog was gone and the make of gas was nearly equal to the demand, we would at once get improved pressures, irrespective of the quantity in stock. However, gas engineers must sooner or later aim at extending plants so as to supply the demand at all times, in order to hold the confidence of their consumers and add to the general satisfaction of all concerned.

Mr. M'Intyre concluded his long paper with a few approximate comparisons as to costs.

DISCUSSION.

Mr. JAMES JAMIESON (Greenock) stated that he was interested in the little benzol starting arrangement referred to in the paper; and he

called for some further particulars relating to it. Referring to comparison of costs between gas and electricity, it was a well-known fact that gas had an advantage; but this advantage was so slight that the electric motor for small drives was bound to take first place. Regarding thermal efficiency, he asked if it were practically limited to the stability of the engine. He was curious to know how an increase of hydrogen in the gas would affect an engine.

Mr. James M'Nicol (Dawsholm) was of the opinion that there was a great future for the gas-engine if it were properly developed. It appeared to him to be strange practice that, to keep some small plants going, steam had to be generated in a boiler and then passed on for the propulsion of an engine, when the work could be equally well performed by a gas-engine. He referred to the motor-car as an instance of rapid development and its reliability when running on town's gas, either in the manufacturer's test-shop or on the road. If the gas-engine were developed on similar lines, it would prove a strong competitor with the electric motor for light work.

Mr. W. J. Lennox (Falkirk) did not think Mr. M'Intyre had left much room for discussion. His paper had been so complete that he practically asked and answered the questions himself. One of the drawbacks to gas-engines was the space required for the larger types and the water cooling-tanks. Many firms had not the space available and, therefore, adopted the electric motor. He considered that Gas Associations should go in for propaganda work advocating the use of gas-engines.

Mr. A. Sutherland (Glasgow) considered one of the most important points in the paper was the reference to a steady supply pressure diagram, which was absolutely necessary if consumers were to be induced to adopt gas for power purposes.

Mr. Thomas Workman (Dalmarnock) stated that he once had the experience of dealing with four gas-engines which took as many as eight men to start them. He was of opinion that the same state of matters existed to-day. The engines were all right when running; but the man in charge was very reluctant to stop them once they had been set in motion.

The President said that it seemed peculiar that they could not put the same movement into the gas-engine as was in a motor-engine; both being somewhat similar in construction. In his town, a consumer had trouble with his gas-engine, and called in the makers to put it right. They put the blame on the gas, stating that it was defective, and that an increase of pressure was necessary. However, the makers found latterly that it was their magneto that was at fault; and after installing a new one, the engine ran smoothly.

Mr. M'Intyre, replying to the discussion, stated that in connection with the benzol starter, as far as he knew there was a little cup on the top of the starting valve whereby benzol or petrol spirit could be introduced into the cylinder. Thereafter, the engine was given a half-turn backwards along a compression stroke with the cup open and some air drawn in to form a mixture, and the slight vacuum vaporized the spirit. The cup was then shut, and the engine turned on a compression stroke; the magnetos being then sparked-off by hand, and the engine started-up. The electric motor was no doubt more convenient in warehouses in the centre of the city, where small powers were required, and the situation of the premises did not permit of heavy machinery being installed. Thermal efficiency varied with the moving parts, and the compression ratio was the greatest governing factor on this efficiency. The percentage of hydrogen in the gas would not affect the work of an engine to any great extent. As to the future development of the gas-engine, he was of the opinion that large gas undertakings would do well to put down model plants in their gas-works, and show how electricity could be generated. This would be one of the best advertisements they could get for advocating the use of town's gas for generating electricity for moderate demands. Mention had been made of gas-engines requiring eight men to start them. What he thought might be wrong in the instance quoted was the want of a waste-oil blow-off in the cylinder, whereby the hot residue from the heavy flash-point oil for lubricating the engine piston could be removed while the engine was running.

Mr. M'Intyre was cordially thanked for his paper.

House Heating by the "Rector" System.

Explaining in the pages of the "Gas Record" the steps taken by the Pacific Gas and Electric Company to cultivate house-heating business, Mr. F. S. Myrtle points out that almost every home in San Francisco needs quick heat on the cold, damp days—the sort of heat that can be regulated in a scientific way so that just the right amount is furnished. Gas is the ideal fuel. Various new types of heaters and appliances have eliminated any faults that earlier kinds may have possessed. One appliance which he mentions as coming near to perfection is the "Rector" system of gas heating. With this, heat is supplied from a cast-iron radiator indistinguishable from those carrying steam or hot water. The radiators are connected by a system of piping which leads to an electric motor and blower in the basement, through which all odours or products of combustion are carried away. The blower also serves to draw into the room a supply of fresh air, maintaining the purity of the atmosphere, regardless of the length of time the room is heated. Economy of operation is one of the greatest advantages claimed for the system. It burns gas in a partial vacuum created by the motor and blower. Consequently the air is drawn into the burner, making a perfect mixture with the gas; and complete combustion is the result. At the same time, the heated fumes are drawn by the motor and blower through the various sections of the radiator till all the heat is extracted and radiated into the room. The "Rector" system has made it possible to solve any heating problem, even in connection with large installations. Gas is burned in each individual radiator; and one or more may be lighted, as desired.

COKE-OVEN MANAGERS' ASSOCIATION

(MIDLAND SECTION).

Questions and Answers.

Mr. J. W. Lee presided (in the absence of Mr. Davy) at a meeting of the Midland Section of the Coke-Oven Managers' Association, which was held at Sheffield, on Saturday, Feb. 28, when various matters relating to the gas industry were submitted in the form of questions, and discussed.

The Chairman said that a list of six questions had been circulated among the members, some of whom had agreed to make statements in order to start discussion.

The Effect of Introducing Steam.

The first question was: "What effect has the introduction of steam into coke-ovens upon the coke produced? Is not its appearance spoiled; and are not its physical properties for blast-furnace work and for steel manufacture considerably reduced?"

Mr. Riley said he would deal with steaming at the Tinsley Park ovens. The point of admission was about 18 in. from the oven sole level, directly in the centre of the doors on both the ram and bench sides. The pipe entering the charge was ¾ in. diameter, gauged-down at the outlet to ⅜ in.; and it was 3 ft. long. The superheated steam was used at from 90 to 100 lbs. pressure. Only twelve ovens out of fifty-five were connected for steaming. Six hours or so before the oven was ready for discharging, a bar was rammed into the charge, then withdrawn, and the nozzle inserted. The steam was gradually turned on at both sides, until the full pressure was applied, and continued until the charge was drawn. With regard to the loss of carbon, or the physical properties of the coke being altered due to the action of the steam, this was almost negligible. In his opinion, the steam was not on sufficiently long to cause any appreciable reduction. The steaming took place in about six hours; and the ordinary coking time was not lengthened. As to the percentage of coke obtained, they had not noticed any appreciable increase. Three months prior to steaming, the amount of surplus gas they sent to Sheffield was 41,924 c.ft. per oven charged. In three months of steaming they got 51,126 c.ft. per oven charged. During the past week, they had gone up to 58,210 c.ft. per oven charged of surplus gas. At the same time, he did not think this was due to steaming, though it might have assisted. They did not bother much about the carbon monoxide contents, so long as they kept the gas fully up to standard. At first he thought the steaming might damage the wall; but he had not seen any damage where the steam entered the oven. There was no appreciable damage from CO_2; and the quality of the tar produced was such that they had not had any complaints about it. The greater part of the tar was given off before the steaming commenced. They had not noticed any increase in the quantity of liquor treated.

The Best Percentage of Moisture in Coal.

The next question was: "What percentage of moisture in coal for use in coke-ovens gives the best practical results?"

Mr. Thomas B. Smith (the Acting Secretary), in reply, dealt with the subject of dry *v.* wet coal. Almost since the foundation of the coke-oven industry, he said, it had been an accepted fact that the best yields of bye-products were obtained by carbonizing coal containing 8 to 10 p.ct. of moisture. He contended, however, that this was not the case. In America, the benefit of carbonizing dry coal had been fully realized; the reduced carbonizing period being to a large extent due to using dry coal. The increased rate of carbonization had a considerable effect upon the yields of bye-products. The proportion of sulphate of ammonia per ton of coal was less when carbonizing dry coal than wet; this obviously being due to the coal being more quickly raised to a high carbonizing temperature. But, as was generally known, the loss of ammonia was usually attended by a larger percentage of cyanogen, which, should the cyanide industry thrive, would be of considerable importance. By reducing the percentage of moisture from 8 to 3, the yield of sulphate of ammonia dropped from 30 to 28½ lbs. per ton of coal. The amount and quality of the tar obtained were not to any material extent affected by carbonizing dry coal. The aiming at the minimum formation of liquor condensation being entirely peculiar to the direct process, one of the greatest advantages of using dry coal was confined to this type of plant. The effect on the production of benzol was very noticeable. It was found that, by reducing the percentage of moisture in the same quantity of coal from 8 to 3, the yield of benzol per ton of coal was raised from 3·10 to 3·95 gallons. These figures were the average of a period of weeks. As to the life of oven-walls as affected by salty coal, he thought everyone was convinced that the presence of free moisture considerably helped the fusion of the oven-wall in the case of coal containing sodium chloride and sulphate to any appreciable extent. Speaking of the loss of thermal power when carbonizing wet coal, he said, allowing that the efficiency of heating a generative battery was 60 p.ct., the gas burnt in the flues to drive 10 p.ct. of moisture from a charge of coal in a 9-ton oven would be 12,866 c.ft., or 15·9 p.ct. of the total gas given off from the remaining 8·1 tons of dry coal. Not only was the thermal power wasted, but this was

only half the trouble. This quantity of superheated steam had to be condensed in the cooling plant, involving a considerable increase of cooling surface. This point was of special interest to plants with an inadequate supply of cooling water. The carbonizing period of a 9-ton oven using dry coal was approximately 20 to 21 hours, against 27 to 28 hours with wet coal, or a reduction of 25 p.ct. He summarized the effect of carbonizing dry coal as follows: Output increased by 25·9 p.ct.; surplus gas increased by 15·9 p.ct.; effluence reduced to a minimum; benzol increased by 0·85 gallon per ton; the life of oven-walls considerably lengthened; cooling efficiency raised by at least 25 p.ct.; sulphate reduction of $1\frac{1}{8}$ lbs. per ton; elimination of capital maintenance and labour costs.

DETERMINING HYDROGEN, METHANE, AND NITROGEN IN COAL GAS.

The third question was: "What are the most accurate methods of determining the amounts of hydrogen, methane, and nitrogen in coal gas?"

Mr. C. P. FINN said that in commercial laboratories the type of apparatus in use for controlled gas analysis was usually that of Hempel, or some form similar to the Orsat. The liquid in use in the measuring burette was generally water or a mixture of glycerine and water. Used carefully, the Hempel apparatus was satisfactory for most ordinary control work—being simple and easily manipulated, while its accuracy was twice that of the portable Orsat. If more accuracy was required, the form described by Bone and Wheeler* was representative; mercury being used in the burette. The methods of determining hydrogen and methane after the removal of carbon dioxide, &c., fell into two groups—(1) explosion methods; (2) combustion methods. In the first method the gas might be mixed with sufficient hydrogen and exploded in a special form of pipette over mercury, or with air if the explosion was arranged to take place in the ordinary explosion pipette. In each case the contraction in volume was measured, and the resulting CO_2 was estimated by absorption in caustic potash. From these data the percentage of methane and hydrogen might be determined. Another method was first to remove the hydrogen by absorption with palladium sponge and then determine the methane remaining by explosion with air, or by passing a mixture of gas and air over a white-hot platinum spiral. The palladium method was uncertain, as under certain conditions it became "sick" or "poisoned" and lost its absorptive properties. A slower method for absorbing hydrogen was that of employing a 1 p.ct. solution, freshly prepared, of palladium chloride. By the oxygen method, using the large pipette, methane could be determined within 0·2 p.ct. and hydrogen 0·3 p.ct. By the air method, with the small pipette, the accuracy was 1 p.ct. for methane and 7·5 p.ct. for hydrogen. The objections raised against the explosion methods were: (*a*) The risk to the operator, (*b*) the possibility of error due to the burning of some of the nitrogen. To obviate these risks, combustion methods had been proposed, such as passing a mixture of gas and air or oxygen over heated copper oxide. By heating to 850° C., hydrogen was burnt, and at a higher temperature the methane was burnt. Morgan, in the article on "Gas Analysis" in Thorpe's Dictionary, gave a method for the absorption of the resultant carbon dioxide in baryta and titration with oxalic acid. Drehschmidt's method was to pass the oxygen mixture over platinum wires heated to redness in a platinum tube. Nitrogen was usually estimated by the difference between 100 of all the gases estimated. If it were necessary to distinguish between nitrogen and the inert gases, this could probably be done by passing the gas over heated magnesium or lithium.

DISCUSSION.

Mr. SMITH described how in a number of experiments and for permanent use he had installed a fine capillary platinum tube. The bore of the tube was so fine that it could not practically be got finer. The gas, after the carbon monoxide and the carbon dioxide had been taken out, was made up with oxygen and passed through the tube, which was 4 in. in length, when the tube was heated to redness with a bunsen burner. The internal burning of the gas was so intense that the tube became white hot. For safety it was advisable to have a bunsen burner; otherwise passing it through the platinum tube was quite successful. They had been satisfied with the results obtained from it; and he had used the same tube for a number of years. At the end of six or seven years, a tube he had been using had become crystallized, and he had sold it for three or four times as much as he had paid for it. He had a new one which was giving every satisfaction.

Mr. FLEMING said he had done a lot of work on various types of gases, and he discovered a little while ago a considerable discrepancy between the results obtained on using platinum and asbestos. When he made special preparation, however, he found he was getting results practically consonant with using explosion methods. He obtained results with 3 to 5 p.ct more hydrogen than with the combustion method. He had not had an opportunity of developing the research; but he suspected that this happened quite frequently. He wanted, however, to make a test by the explosion method. He had not used a capillary platinum tube for the combustion of gases; but he thought it would be quite as effective as an explosion.

* See "JOURNAL," Vol. CI., p. 160.

Mr. SMITH said of course it was possible that the difference in the figures was due to the decomposition of nitrogen in the explosion. The benefit of the platinum tube was that one obtained the temperature without the explosion. He could hardly imagine that the difference would run to 5 p.ct.

Mr. NICKLIN said he had never satisfied himself that he had obtained a correct analysis. It was his business to rectify the gas and get it a little better as quickly as possible, and thus the time passed before he could make investigation. Very likely it was nitrogen.

The CHAIRMAN said that they might be able to analyze such gases by the explosion method. It had been done with 40 p.ct. of nitrogen by the explosion method. They had to be very careful in using the Haldane method. He once tested the outlet of a gas-engine with a Haldane apparatus, and he lost his apparatus. His assistants had used the Hempel apparatus. The difficulty was to find the best point for the residual gas, and if one was using air, to find just the best mixture to get a perfect explosion. The only way was to do a number of explosions. It was a little difficult to find the best point; but in general practice it was about 18 c.c. of the original gas. One had to find this for one's experiments for nearly each explosion. If this was not done a figure would be obtained for hydrogen which was wrong. Nitrogen could be estimated with a Hempel. The method was to take a proportion of the residual gas and mix it with air. Of course, they knew how much nitrogen they were adding with their air. After the explosion, they took the shrinkage. The residual oxygen having been absorbed, they would find that the nitrogen was coming from the air which had been added, and they had nitrogen in the proportion of the residual gas which was taken. If the explosion had been perfect, they could estimate the amount of nitrogen due to the proportion of residual gas, and thus they obtained the amount of nitrogen in the original sample.

Mr. FLEMING said it was very difficult to get all the carbon monoxide absorbed. In some cases there seemed to be some carbon monoxide left, and an explosion was obtained which was detrimental to the test.

The CHAIRMAN said he found that this was really the case in practice.

BRIQUETTES FROM SMALL COKE.

The "Journal für Gasbeleuchtung" for Jan. 17 contained an interesting account of the use which is made at the Nürnburg Gas-Works of coke-dust for the manufacture of briquettes. The process renders saleable a considerable quantity of coke which would otherwise be waste, and which has reached larger proportions owing to the poor quality of the coal which has had to be carbonized.

The apparatus—supplied by the firm of Humboldt Kalk—makes egg-shaped briquettes by binding the coke with pitch. The coke dust is delivered into a container; and the pitch, broken into nut-size, is passed through a centrifugal crusher. The coke and pitch dust are then taken in the correct proportions from their respective containers by a mechanical device, and passed by a screw-elevator to the mixing apparatus. Here, by means of superheated steam at about 200° C., the mixture is heated to the necessary temperature for the pitch to become binding. The mixture is then ready for pressing, and is fed on to a conveying device which takes it through rollers. These compress it, mould it, and deliver it as finished briquettes, which pass down a shoot into a truck.

The strength of the briquettes depends chiefly on (1) the nature of the pitch and its degree of softening; (2) the proportions of the mixture; and (3) the pressure which the two rollers exert. In the case in question, 15,000 kilos [about 15 tons] is the pressure used. The proportion of pitch cannot be varied very much. If too little is used, the briquettes are not strong enough; if too much, they do not readily fall out of the moulds in the rollers, but stick, and cause stoppages of the plant. The briquettes at Nürnburg are tested on the works by special apparatus for their strength, and they average about 80 kilos. [176 lbs.].

At first, wear and tear was found to be very heavy on the moulds of the rollers; but improvements have been effected, which permit of 2000 tons of briquettes being produced without renewal. With one compressing set working three shifts, from 60 to 70 tons of briquettes are produced in a day. According to quality, 6 to 8 p.ct. of the mixture is pitch. It is clear that, by using softer pitch, with better binding qualities, less need be used; and it has been found of advantage to use up waste pitch from the retort-house rather than the harder qualities obtained from tar distillation. The briquettes (roughly speaking) are equal in calorific value to coke, and have proved excellent for domestic purposes and boiler-firing. They have been tried for water-gas production, but were not found suitable. It is suggested, however, that they might be used to supplement the coke used in the producers.

Temporary Increase of Charges Act.—The Ministry of Health have issued an Order authorizing the Tow Law Urban District Council to increase the maximum price to be charged by them for gas from 6s. to 7s. 1d.—subject to rebate.

CARBONIZATION OF LIGNITE.

Owing to the acute shortage of gas coal in Germany, great interest is being taken there in the use of lignite or brown coal for the production of gas, as large quantities of it are available in the country. It will be seen from the following particulars that, whereas a large make of gas per ton can be obtained, the chief difficulty lies in the coke, which is poor both in quantity and quality, is exceedingly difficult to quench, and is therefore liable, if great care is not exercised, to combustion on the coke-heap.

The first part of the following article is an abstract of a communication to the Works Committee of the German Gas Association by Dr. R. Geipert, of Mariendorf, which appeared in the "Journal für Gasbeleuchtung" for Dec. 13.

Coke Quantities and Qualities.

In the autumn of 1918 the Mariendorf gas-works received a consignment of Bitterfeld brown coal, which gave the following analyses in percentages:

	Unscreened.	Screened.	Briquettes.	
Water	49·4	37·1	16 4	16·7
Ash	4·8	5·2	6·4	7·4
Fixed carbon	19·6	26·9	34·4	29·2
Volatile matter	26·2	30 8	42·8	46·7

Experiments were made by carbonizing the screened coal and the briquettes in a 16 ft. vertical retort, which generally takes 11½ cwt. charges of gas coal. With the brown coal, slightly smaller charges were carbonized in twelve hours in the case of the screened, and eight hours for the briquettes. The resulting coke was very small; and, when the retort was opened for discharging, rapid combustion of the coke-dust was set up—almost with explosive force. There was a similar result with an inclined retort. Experience with nut coke suitable for boiler-firing has been limited, but it seems to burn only slowly.

Another experiment with a mixture of 450 kilos [8·86 cwt.] of Westphalian unscreened coal with 150 kilos [2·95 cwt.] of brown-coal briquettes was made in a vertical retort. The resulting coke did not break-up badly when the retort was discharged. The brown-coal briquettes when carbonized were embedded in the other coke, and retained their original form. The mixed coke was, therefore, quite usable, though it was difficult to quench. It had to be thoroughly soaked; otherwise the briquette coke in the mixture always broke again into flame.

Laboratory experiments were made with mixtures of powdered Westphalian gas coal and powdered brown-coal briquettes. The analyses of the coals were:

	Gas Coal.	Briquettes.
Water	1·0	16·7
Ash	5·6	7·4
Fixed carbon	64·1	29·2
Volatile matter	29·3	46·7

Carbonized separately, the gas coal gave 69·7 p.ct. of good coke and the brown coal, 36·6 p.ct. of very small coke. In mixtures with 10 and 20 p.ct. of the brown coal, 66 and 63 p.ct. respectively of good hard coke was obtained. But with 40 p.ct. of brown coal, only 57 p.ct. of coke was obtained; and it was of a more breakable nature.

Comparison with Gas Coal.

For comparison with gas coal, the author took some carbonization results for Hungarian brown coal, which were obtained at the Karlsruhe Instructional and Experimental Gas-Works. An analysis of the brown coal in question gave:

	P.Ct.
Water	10·6
Ash	9·9
Combustible matter	79·5

From a metric ton [0·98 of an English ton] were obtained:

Gas	393 cb.m. of 5195 calories	= approx.	13,880 c.ft. of 580 B.Th.U.
Coke	455 kilos.	= ,,	8·9 cwt.
Tar	46 ,,	= ,,	101 lbs.
Ammonia	2·28 ,,	= ,,	5·02 lbs.

For comparison, take the production from a ton of moderate gas coal as:

Gas	290 cb.m. of 5400 calories	= approx.	10,240 c.ft. of 600 B.Th.U.
Coke	700 kilos.	= ,,	13·8 cwt.
Tar	50 ,,	= ,,	110 lbs.
Ammonia	2·6 ,,	= ,,	5·73 lbs.

The author then takes the cost of the production of the gases at 20 pf. each per cb.m., and the market prices of the coke, tar, and ammonia at 150, 300, 3000 marks respectively—giving the brown-coal coke only half the value of the other, owing to its poor quality. Then 290 cb.m. of 5400 calories are equal to $\frac{290 \times 5400}{5195}$ = 300 cb.m. of 5195 calories. Thus the relative values of the two coals to a gas-works are shown as:

Gas Coal.		Mk.	Brown Coal.		Mk.
Gas	300 cb.m. at 0·20 =	Mk. 60·0	393 cb.m. at 0·200 =	Mk.	78·60
Coke	700 kilos ,, 0·15 =	,, 105·0	455 kilos ,, 0·075 =	,,	34·12
Tar	50 ,, ,, 0·30 =	,, 15·0	46 ,, ,, 0·300 =	,,	13·80
Amm.	2·6 ,, ,, 3·00 =	,, 7·8	2·28 ,, ,, 3·000 =	,,	6·84
		Mk. 187·8			Mk. 133·36

Carbonizing results from the Bitterfeld brown coal mentioned at the beginning of this article are not known to the author; but, estimating for them on the basis of the coal analyses, he gives the following comparison of their values:

Unscreened brown coal	72·65 marks per ton.
Screened ,, ,,	91·65 ,, ,,
Briquetted ,, ,,	130·02 ,, ,,
Gas coal	187·80 ,, ,,

In making this calculation, he assumes that, owing to the high water percentage in the screened and unscreened varieties, the recovery of the ammonia would not be a commercial proposition.

A Dutch Process.

The "Journal für Gasbeleuchtung" recently stated that inquiries have been made with regard to the system of carbonizing brown coal which, it has heard, has been practised with success in Holland. Herr K. A. Wiechmann, who is the inventor of the process, has communicated certain information in confidence, but gives the following facts for publication:

1. Gas is being produced by his process from lignite primarily at the rate of 21,200 c.ft. per ton, with a calorific value of 380 B.Th.U.
2. By means of a subsequent producer-gas process, the make is raised to 31,800 to 42,400 c.ft. per ton—the additional quantity (above 21,200 c.ft.) having a calorific value of only 200 B.Th.U.
3. The calorific value can be subsequently improved by means of an auto-carburetting process with tar.
4. The necessary alterations to ordinary carbonizing plant can be effected by gas-works labour at no great cost.

Herr Wiechmann is prepared to give full details of his process for a fee of 500 marks. Our German contemporary considers that (1) and (2) are based on sound and well-known principles of theory and practice, though naturally the make and the calorific value depend on the quality of the lignite used. Judgment on the carburetting process is reserved. Even if it is technically practicable, its commercial success is open to doubt, and of course it depends largely on tar prices.

Gas-Works Experience in Bavaria.

In continuation, the "Journal für Gasbeleuchtung" quotes a communication received from Herr Stephan, of Erlangen, in which he states that many works in Bavaria have been compelled to use (sometimes for months at a time) as much as 50 p.ct. of brown coal, and even brown coal only. The experience here has been that the carbonization of lignite and gas coal must be kept separate, if such large quantities of the former are used; otherwise insufficient good coke is obtained even for the producers. This is particularly so in the large number of cases in which even the so-called gas coal received is of such poor quality that it gives only small coke, even when it is carbonized alone.

Adding a Holder Lift while in Operation.

A job of increasing the capacity of a holder while in operation, which has been carried out by the Russell Engineering Company, was described by Mr. W. D. Birbeck in a recent issue of the American "Gas Age." The holder had a concrete tank below ground, and had been built as an inner section of a two-lift holder, complete with cup and guide-framing arranged for extension. As it was the only holder, the work had to be done without putting it out of commission for any length of time. The original capacity of the holder was 50,000 c.ft. The guide-framing extension was completed first; the columns and girders being raised by means of a shear-pole on the crown, which required the inner section to be pretty well up. It was then necessary to raise the top brackets and rollers, to extend over several courses of the outer section, to permit riveting of the new work. After this the outer section was started; the bottom curb and bottom course of side sheets being placed round the inner section, and carried on ties extending over the top of the tank. When riveted, the second course of side sheets was added; the two being next transferred to a lowering device, and the ties removed, after lowering the water-level in the tank. The outer section was then lowered to a depth that would permit of hanging and riveting the third course of side sheets from the top of the tank. As each course was riveted, it was lowered until all was ready for the top course, which was riveted-up in sections complete with the grip sheets. For about a day-and-a-half the holder was out of service, while the inner section was landed, to change the bottom rollers. The holder being fitted with a 7-in. channel-cup, which gave 11 in. of space between the sections, increased the storage available during the early stages of the work, as it was possible to lower the water gradually; while if the old design of 6 in. channels had been used, it would not have been possible to work in the 9-in. space which would have been secured between the sections, and it would have been necessary to lower the water level at the start (so that the holder could only rise about 3 ft.), and work from the crown.

Warning against the Use of Cheap Unfit Tubing.—The American Gas Association have issued a warning to gas consumers against the use of cheap unfit tubing in connection with gas appliances. The Association say that such tubing is a menace to life, and is responsible for many of the accidents attending the use of gas heating-devices.

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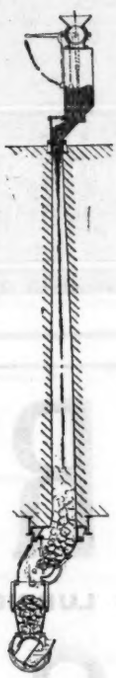

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REGISTER OF PATENTS.

Transforming Synthetic Ammonia into a Transportable Product.—No. 131,870.

L'AIR LIQUIDE SOCIÉTÉ ANONYME POUR L'ETUDE ET L'EXPLOITATION DES PROCÉDÉS GEORGES CLAUDE, of Paris.

No. 6448; March 14, 1919. Convention date, Aug. 24, 1918.

The patentees say: In our British specification No. 130,365 of Jan. 29, 1918, a process was described for the manufacture of ammonium chloride and carbonate of soda, both in a solid state, which utilizes (as raw materials) sea salt, water, coal, and air. It was mentioned that, in order to obtain solid ammonium chloride, it was necessary to concentrate by evaporation the ammonium chloride liquor obtained, or to separate from it by fractional crystallizations the carbonate of soda that it contains. The object of the present invention is to obviate these evaporations or crystallizations, and increase the purity of the solid chloride. To this end it modifies the process indicated in Schreib's German patent No. 36,093, of June 14, 1885.

The principal claim made for the invention is for improvements in the process of transformation of synthetic ammonia into a transportable product directly utilizable for agriculture in conjunction with the production of carbonate of soda which formed the subject-matter of patent No. 130,365, consisting in the combination of the following steps:

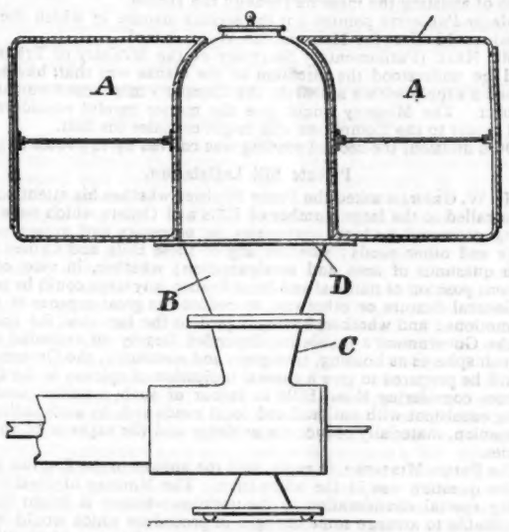
(*a*) Adding to the liquor which has precipitated, bicarbonate of soda, sea salt, ammonia, and carbon dioxide; the sea salt added being in such limited quantity that it always remains dissolved throughout the subsequent operation, and consequently does not mix with the ammonium chloride. (*b*) Cooling the solution to about 0° to 5° C. (*c*) Eliminating the ammonium chloride precipitated. (*d*) Treating the remaining liquor with sea salt and carbon dioxide with precipitation of bicarbonate of soda and formation of a fresh ammonium chloride liquor. (*e*) Centrifuging the ammonium chloride obtained and heating it to a temperature in the neighbourhood of 70° C., in order to destroy its alkalinity.

Gas-Heating Apparatus.—No. 137,970.

LEA, F. M. & D. H., of Birmingham.

No. 8869; April 8, 1919.

This invention relates to gas heating apparatus of the type in which an enclosed atmospheric burner is arranged in conjunction with an expansion pipe or chamber communicating with an outlet pipe, as described in patent No. 121,619—the present invention comprising the arrangement over (or in close conjunction with) the part receiving the first or direct heat from the burner, of a detachable surrounding oven or water heater.



Lea's Gas-Heating Apparatus.

As shown, an annular detachable oven A, or water-chamber, is arranged to fit over the outer chamber B mounted above the burner, which is contained within the enclosed chamber C at the base of the apparatus. The part A is carried by a flange D on the part B. Preferably, the chamber is made of sheet metal.

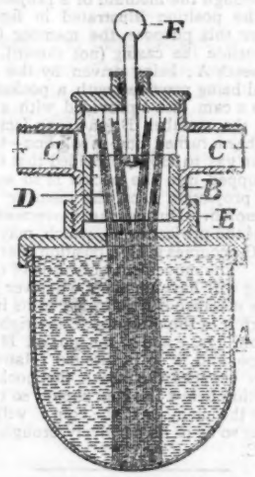
By this invention the patentees claim that they are able to utilize some of the heat for cooking or other purposes, or for providing a supply of hot water. When not required, however, the oven or water heater can be lifted off.

Gas-Enrichers for Gas-Lighting Systems. No. 138,456.

FOSTER, J., of Erdington, Birmingham.

No. 5473; March 5, 1919.

This invention relates to a device for "improving the luminosity of feebly luminous gas when burned at an ordinary batswing or like burner, being particularly adapted for attachment to the gas-pipe on the user's system." It comprises a closed vessel containing benzol or other liquid, with a transverse passage having pipe connections at its ends and crossing the upper side of the vessel—a wick depending from the passage into the liquid.



Foster's Gas-Enricher.

As shown, a closed vessel A, containing benzol, petrol, or other suitable liquid, has in its cover B a transverse passage C, the ends of which connect to an ordinary service-pipe, so that the gas passes through the passage. Across the passage is a wick D, dipping into the liquid. The gas passing over the wick carries a small amount of the vaporized liquid with it, and, "by being thus enriched, produces a more luminous flame when burned at an ordinary batswing or like burner." The amount of vapour added to the gas can be varied by increasing or decreasing the number of strands in the wick or by surrounding the wick with an adjustable sleeve or screen E, by which the surface exposed to the gas can be adjusted. The sleeve is slidable in the part containing it, and is movable by an externally projecting stem F.

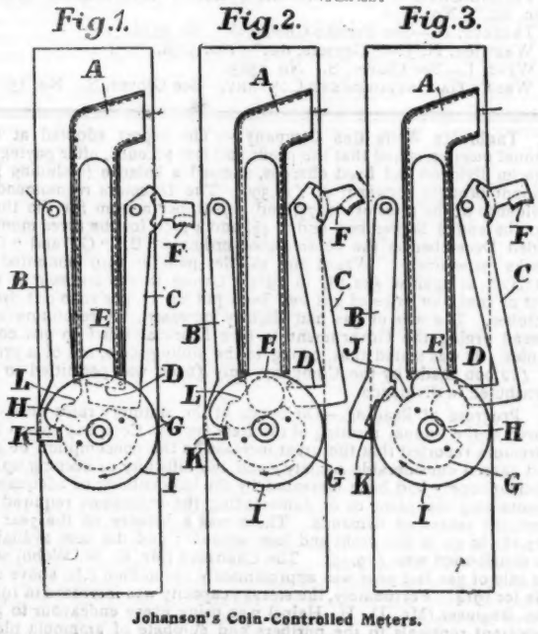
The invention is said to be particularly adapted for use in workshops supplied with gas of low luminosity, and where the employment of atmospheric burners fitted with incandescent mantles is impracticable.

Coin-Controlled Meters for Gas, &c.—No. 138,521.

JOHANSON, G. K. V., of Stockholm.

No. 12,027; May 13, 1919.

This invention relates to apparatus provided at the lower end of a coin shoot with a movable member connected with the delivery valve for the gas, operated through the medium of a coin by a second member opposite the first one, and adapted to be moved from outside, so as to open the valve, and provided below the coin-shoot with a rotatable disc connected with the meter; the disc being provided with a pocket for receiving the coin.



Johanson's Coin-Controlled Meters.

The illustration shows the apparatus with its parts in different positions.

A is the coin-shoot, which is open in front o covered by a transparent pane. B is a member rotatable on the stud above, and

connected with the delivery valve for the gas in such manner that the valve is maintained closed when B occupies the position illustrated in figs. 1 and 2, but is open when it is turned into fig. 3 position. Opposite the member B there is another member C (rotatable on the stud above it), serving through the medium of a projection D and a coin E to move B from the position illustrated in figs. 1 and 2 to that shown in fig. 3. For this purpose, the member C has an operating arm F projecting outside the casing (not shown). A disc G is rotatably journalled beneath A; being driven by the meter (in any convenient manner) and being provided with a pocket H. The disc G is rigidly connected to a cam disc I provided with a deep notch J, into which a lug K on the member B may snap (actuated by a spring) when the disc has been turned one revolution—thereby causing the delivery valve for the gas to close, provided that in the meantime no further coin has dropped into the pocket H so as to prevent, by engagement with the projection L on the member B, the lug K from snapping into the notch. During the movement of the disc G it obstructs the path of the projection D, which may be turned inwards only when the disc G occupies such a position that the pocket is in its uppermost position. The movement outwards of the member C while the disc G is rotating will have no effect whatever on the operation of the apparatus. The member B is returned to its initial position by a spring tending to turn it in the direction to the right in the drawing.

As will be seen from figs. 1 and 2, the pocket H in the disc G has such an oblique shape, and is so positioned relatively to the notch J, that when the lug K engages the notch the pocket is retained in a slightly oblique position below the coin shoot; so that when the member B is actuated by the member C the coin E will be pressed downwards into the pocket so as to be positively brought along during the rotation of the disc C.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official List" for March 3.]

Nos. 5325-6109.

ALLEN-LIVERSIDGE, LTD.—"Gas-burners." No. 5819.
ANDREWS, F. A.—See Allen-Liversidge. No. 5819.
BARBÉ, M.—"Apparatus for lighting and extinguishing gas-burners of street-lamps." No. 5759.
BARNARD, P.—See Barbé. No. 5759.
BISS, W. R.—"Incandescent gas-lamp." No. 6077.
CANTAIS, G.—"Gas-heated boiler for water or steam." No. 5659.
CRUICKSHANK, J.—"Hotplates and ovens." Nos. 6070, 6071.
GARROW, J. R.—"Continuous production of solid and gaseous fuel with bye-product recovery." No. 5403.
GLOVER, S.—"Vertical retort-settings for destructive distillation of coal, &c." No. 5563.
GLOVER, T.—"Gas-stoves." No. 5667.
ILLINGWORTH, S. R.—"Coking coal." No. 6078.
JAMIESON, J. S.—See Cruickshank. Nos. 6070, 6071.
LEACH, R. W.—"Taps or cocks." No. 5489.
LEWIS, G. P.—"Means of distilling and gasifying solid carbonaceous matter and recovering gaseous products therefrom." No. 5926.
LUCATO, C. R.—"Filter and pressure-equalizing device for acetylene generators and burners." No. 5673.
NIELSEN, H.—See Garrow. No. 5403.
PERRY, W. P.—"Apparatus for distilling carbonaceous material." No. 5666.
RENNISON, F. T.—"Gas-heated furnaces." No. 5520.
SOUTH WALES AND MONMOUTHSHIRE SCHOOL OF MINES.—See Illingworth. No. 6078.
TECHNO-CHEMICAL LABORATORIES, LTD.—"Evaporation, distillation, &c." No. 5558.
TESTRUP, N.—See Techno-Chemical. No. 5558.
WARWICK, H. J.—"Geysers, &c." No. 5858.
WEST, J.—See Glover, S. No. 5563.
WEST'S GAS IMPROVEMENT COMPANY.—See Glover, S. No. 5563.

Tunbridge Wells Gas Company.—The report adopted at the annual meeting stated that the profit and loss account, after paying an interim dividend and fixed charges, showed a balance (including the amount brought forward) of £11,396. The Directors recommended dividends at the rates of 10, 7½, and 7 p.ct. per annum for the three months ended September, and 7, 4½, and 4 p.ct. for the three months ended December on the consolidated ordinary "B," "C," and "D" stocks respectively. Wages and salaries paid in 1919 amounted to £21,128, as against £12,187 in 1914. Owing to the increase in the cost of coal, the price of gas had been put up 1s. per 1000 c.ft. from October. The sale of gas had slightly increased. A resolution was passed urging the Government to give financial relief to gas companies. It was stated that, owing to the sliding-scale, out of a profit of £12,000 made by the Company, only £6000 was permitted to be distributed in dividends.

Progress at Reading.—Dividends at the statutory rates were declared at the annual meeting of the Reading Gas Company, when the Directors reported that the great increase in the consumption of gas had caused considerable anxiety; and the difficulty of keeping up an efficient supply had been increased by the impossibility of adequately maintaining the plant or of commencing the extensions required to meet the increased demands. There was a balance on the year of £15,283 to go to the profit and loss account; and the sum available for distribution was £29,355. The Chairman (Mr. G. W. Webb) said the sale of gas last year was approximately 150 million c.ft. above the sale for 1914. Fortunately, the storage capacity was increased in 1916. The Engineer (Mr. D. H. Helps) was using every endeavour to get important renewals to the purifiers and sulphate of ammonia plant carried through before next winter; and he was also busily engaged on plans for the extension of the manufacturing plant. The proposed extensions would involve a large capital outlay. At a subsequent extraordinary meeting, the Directors were authorized to raise further capital.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

The opposition to the Masham Urban District Council Bill has been withdrawn.

The further Standing Orders applicable to the following Bills have been complied with: South Metropolitan Gas Bill, South Suburban Gas Bill.

The South Metropolitan Gas Bill and the South Suburban Gas Bill were read a second time; and committed.

The Rugby Gas Bill was reported, with amendments.

HOUSE OF COMMONS.

Progress of Bills.

Standing Orders not previously inquired into have been complied with in the case of the Southend-on-Sea Gas Bill, and of the Rochester, Chatham, andGillingham Gas Bill.

Great Northern Railway Bill.

Colonel NEWMAN, when the Bill came before the House on the Order for second reading, on Monday of last week, moved that it be read a second time upon that day six months. He stated that he had been asked by the Association of Urban District Councils to oppose a clause which seemed to be entirely without precedent—the clause which enabled the Company to purchase gas, water, or electricity from any authority or company in any area through which the railway ran, and to convey these commodities and use them upon any part of the Company's property, though the place might be beyond the limits of supply of the undertakers from whom the gas, water, or electricity was purchased. The clause if allowed might deal a serious blow to the undertakings referred to, which had been erected at considerable expense.

Mr. WATERSON remarked that the proposition was an exceedingly novel one. In fact, he was informed that there was no precedent which could be turned to for enlightenment. It might place upon urban district councils great responsibility which at the present time they were not in a position to contract.

Sir F. BANBURY said the clause was put in because there were cases in which it was not possible to obtain a supply through another authority. He regarded it as a fair proposal; but it had to be considered in committee.

Mr. MYERS thought it an extraordinary thing that a Railway Company could promote a Bill one of the chief clauses of which contained provisions for which no precedent could be found, and that the Chairman of the Company could use his place in Parliament for the purpose of assisting the measure through the House.

Major PRESCOTT pointed out the serious manner in which the proposal would effect the Metropolitan Water Board.

Mr. NEAL (Parliamentary Secretary of the Ministry of Transport) said he understood the intention of the clause was that, having obtained a supply within a district, the Company might use it outside the district. The Ministry would give the matter careful consideration, and report to the Committee who might consider the Bill.

On a division, the second reading was carried by 145 votes to 39.

Private Bill Legislation.

Mr. W. GRAHAM asked the Prime Minister whether his attention had been called to the large number of Bills and Orders which were now being promoted by local authorities for necessary and urgent public work and other needs; whether any of these Bills and Orders dealt with questions of area and amalgamation; whether, in view of the present position of national and local finance, any steps could be taken, in General Statute or otherwise, to reduce the great expense of these promotions; and whether, having regard to the fact that the success of the Government's legislation depended largely on extended areas in such spheres as housing, transport, and electricity, the Government would be prepared to give a general indication of opinion to the Committees considering these Bills in favour of such extended areas as being consistent with national and local needs and, by such indication of opinion, materially reduce the evidence and the expense of the inquiries.

The PRIME MINISTER, in reply, said the answer to the first two parts of the question was in the affirmative. The Minister of Health was giving special consideration to the question whether it might not be practicable to arrange some changes in procedure which would lessen the expenditure in all cases of this nature; and he would shortly be consulting the Advisory Council on the subject. In regard to the last part of the question, the decision in each case must depend on a large variety of considerations, both particular and general, and he was not at present in a position to give any such general indication of the Government's views.

The Working of the Industrial Court.

Sir R. HORNE (the Minister of Labour), replying to a question by Mr. Chadwick on the working of the Industrial Court, said that since Nov. 20, 208 differences had been referred to the Court. These cases had been heard mostly in London; but the Court had also sat in Glasgow, Dublin, Belfast, Liverpool, Manchester, Sheffield, and elsewhere. The Court had settled the general wages arrangements for, among other trades, the gas undertakings throughout Great Britain. The Court appeared to have commended itself both to employers and employees. It was recognized to be an impartial and independent tribunal; and he thought that it had already served, and would continue to serve, a most useful purpose in the national life.

Trades Disputes Act, 1906.

Colonel NEWMAN asked the Prime Minister whether he was aware that large sections of the population view with alarm and resentment

the position created by the Trades Disputes Act, 1906, and whether it was his intention to appoint a Royal Commission to investigate the working of the Act and the amendments desirable thereto.

The PRIME MINISTER said he was not aware that there existed the widespread alarm and resentment suggested, and it was not proposed to appoint a Royal Commission.

South Staffordshire Mond Gas Company's Coal Supplies.

Sir R. COOPER asked the President of the Board of Trade if he would state what steps had been taken to prevent the stoppage of industry in South Staffordshire owing to the almost complete absence of coal supplies.

Mr. BRIDGEMAN said he understood that the question referred to the effect of shortage of supplies of coal to the Mond Gas Company upon industries in South Staffordshire. He had been informed that the position of the Company was being improved by the action of the local Coal and Coke Supplies Committee, who were arranging for additional supplies to be delivered during this week. The firm had ample supplies of slack. He was advised that there was no reason to anticipate stoppage of the gas-works.

Mr. ALFRED SHORT asked the President of the Board of Trade whether the South Staffordshire Mond Gas Company had notified their customers in the Tipton area that, unless supplies of coal could be increased, the supply of gas would cease; whether the Company had made repeated overtures to the Board of Trade Committee controlling fuel supplies for the district and also the Coal Controller without success; whether he was aware that large numbers of workers would be thrown out of employment and trade dislocated; and whether he would take immediate steps to ensure the Company receiving an adequate allocation of coal so that distress might be obviated.

Mr. BRIDGEMAN (the Parliamentary Secretary to the Board), who replied, said everything possible was being done by the District Coal Supplies Committee responsible for the distribution of the coal in the area, and it was hoped that such a stoppage as was indicated would be avoided. As already stated by the Leader of the House, priority in supplies was being given to household consumers and public utility undertakings.

Illuminating Glassware and Burner Imports.

Mr. G. LOCKER-LAMPSON asked the President of the Board of Trade when the restriction of imports of illuminating glassware would be removed.

Mr. BRIDGEMAN, who replied, said the importation of illuminating glassware was not restricted.

Mr. LOCKER-LAMPSON asked whether trade marks had to be on all burners imported into the country.

Mr. BRIDGEMAN said the answer was in the negative. The marking of imported goods was regulated by section 16 of the Merchandize Marks Act, 1887, which prohibited the importation of all goods which bore false trade descriptions as well as the importation of any goods which bore any name or trade mark being, or purporting to be, the name or trade mark of any manufacturer, dealer, or trader in the United Kingdom, unless such name or trade mark was accompanied by a definite indication of the country in which the goods were made or produced. The question whether any amendment of these provisions was desirable was being considered by the Merchandize Marks Committee set up by the Board of Trade.

The Cheapest Gas in Europe.

At the annual meeting of the Sunderland Gas Company last Wednesday, the Chairman (Alderman W. F. Vint), in moving the adoption of the report and balance-sheet, said the expenditure in 1919 was £268,796, an increase of £63,279. The income amounted to £282,550, an increase of £59,089. Coal had cost £149,987, as against £114,333 the previous year; and wages had gone up from £59,926 to £81,407—an increase of 36 p.ct., and of 136 p.ct. over the wages bill for 1914. Residuals produced £144,929, an increase of £41,052. After allocating £2000 to the benefit fund under the Sunderland Gas Act of 1919, the balance of profit was £13,753, which, with interest on investments (£2254), was sufficient to pay the maximum dividend. The Directors had now been able to reduce the price of gas to domestic consumers to 1s. 5d. per 1000 c.ft.—easily the lowest in the country. The consumption of gas showed an increase of 5·16 p.ct. over 1918, and new plant was being constructed to meet the bigger demand, while many repairs and renewals, delayed by the war, were now being undertaken. The clause in the Company's Bill passed by Parliament last year, by which the Corporation were given power to promote a Bill for the acquisition of the undertaking, now fell to the ground; the Corporation having finally made up their mind against purchase. The conversion of the Company's stock into one consolidated stock would take effect from June 30 next; permission of the Board of Trade, acting for the Treasury, having been obtained. For £5 of original stock, shareholders would receive £8 6s. 8d. of ordinary stock carrying a dividend of 6 p.ct.; and for £5 of additional capital stock, £7 1s. 8d. of the ordinary stock would be given, also carrying a maximum dividend of 6 p.ct. A Bill had been deposited for applying to the Company's operations the method of charging for gas on a heat basis, instead of by cubic feet, in accordance with the recommendations of the Beilby report. Colonel T. C. M'Kenzie, in seconding, said the price of the Company's gas was not only the lowest in England, but the lowest in Europe. The report was adopted, and dividends declared of 5 p.ct. on the ordinary stock and 4¼ p.ct. on the additional capital stock, less income-tax, for the six months ended Dec. 31.

Satisfactory Manufacturing Results at Blyth.—The manufacturing results during the past year have been highly satisfactory, state the Directors of the Blyth Gas Company in their annual report; the output of gas having been 20,130,000 c.ft. more than in 1918, while the quantity of coal used was 1457 tons less. After payment of the maximum statutory dividend for the year of 5⅝ p.ct., there is a balance of £4157 to the credit of the profit and loss account.

MISCELLANEOUS NEWS.

BRIGHTON AND HOVE GENERAL GAS COMPANY.

Nearly Twenty Per Cent. Increase in Business.

The Half-Yearly Ordinary General Meeting of the Company was held on Friday, at the Offices, No. 5, Great Winchester Street, E.C.—Mr. A. M. PADDON (the Chairman) presiding.

The SECRETARY (Mr. E. L. Burton, F.S.A.A.) read the notice convening the meeting; and the report and statement of accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said that, accustomed as they were in this undertaking to almost violent fluctuations in the dimensions of their business, the increase brought to the attention of the proprietors on the present occasion was probably the most important in the history of the Company, amounting, as it did, to nearly 20 p.ct. They would be very ill-advised as administrators if they accepted this as an indication of what they had to look forward to in the future; but it would be also very ill-considered on their part if they failed to note its dimensions, and take such measures as might be possible in the future to meet similar extensions of business. The report told them that the Company were still in the thick of their troubles, and had still to meet serious contingencies and exactions in connection with the supply of gas. One might have hoped a year ago that some of these difficulties would by this time have been mitigated. They had to face a very important increase in coal freights; while wages maintained their progress, and, of course, salaries must be considered in some sort of relation to the increased cost of living. These things, acting together, would compel them to raise the price of gas yet again, though the increase would be very materially modified by the rebate which they had to give to domestic consumers under the somewhat eccentric regulation termed the Coal (Pit's Mouth) Prices Order and Direction. But speaking generally, the public had not a great deal to complain of in their treatment at the hands of gas undertakings. When they had increased the price of gas again, he was sure that the total rise from pre-war days would not have exceeded 90 p.ct.; and the Directors would deem themselves very fortunate if any one single commodity in which they were compelled to deal on behalf of the Company showed so moderate an increase as 90 p.ct. Turning to the accounts themselves, the capital account showed that since the last meeting the Board had succeeded in issuing some £50,000 of their 6 p.ct. preference stock. This had been an extremely favourable issue for the Company, which would have been impossible to-day. They had less than £50,000 now to issue under their old capital powers; and this in itself would confirm the necessity of the policy that had been adopted by the Board in proceeding to Parliament to ask for further powers in this connection. There was also, of course, a proportion of loan capital left to borrow; but the two taken together represented a very small portion of the capital which it was necessary to spend if they were to put the works in a position to properly meet the demands of the public, and to lower the cost of producing gas. The capital account receipts of £753,401 represented £450 per million c.ft. gas sold, which was a figure that gave them a great deal of confidence in reference to the future, and entitled the administration of the past to very considerable respect. It had been necessary to expend during the half year on capital account £46,740, of which about £45,000 was on plant. This fact would tell the proprietors that they were pushing forward as rapidly as possible the rehabilitation of the plant at the Portslade works. There was a sum of £68,451 to the balance of capital account; but this was only a set-off against the figure in the general balance-sheet which told them that they held in the form of a suspense account £64,317 for prepayment meter fittings, stoves on hire, &c. This was a method of account which was not generally found in connection with gas undertakings; but there were certain peculiarities attached to their Company which made the usual plan of accountancy inapplicable to it. The very great fluctuations to which the Company were subjected if recorded on the accounts of each particular half year in which they occurred, would give an irregularity to some of the statements, to anybody who did not have a long period of years under review. Therefore it was an advantage that there should be a "buffer fund" to absorb these irregularities, and keep the revenue account in some sort of consistent relation to long periods of business. Coal had cost, roughly speaking, 44s. 9d. per ton; and the aggregate of the increase was £12,500. Carbonizing wages had increased by £6600—something like 30 p.ct.—and stood at 5¾d. per 1000 c.ft., which was a high figure; and it was in connection with this figure that many of their hopes for the future arose. Under the heading of repairs and maintenance of works and plant, there had been transferred from the suspense account £9000. Carrying forward the reconstruction of the works from half year to half year, they displaced more plant in one period than in another, but the cost of plant so displaced and replaced should be put into some sort of regulation in the accounts. Therefore six months ago they put by a certain apportionment, knowing that this half year the reconstruction work would require a bigger proportion of outlay; and now they brought back this £9000. There were very considerable increases in repairs and maintenance of meters, stoves, and fittings. Owing to the great variations in their business, they were not able a year ago to make the proper appropriations under these heads; but the Directors felt that, in the circumstances, they could pass that occasion without meeting the full requirements—looking forward to the time, which had now arrived, when they could compensate themselves for the omission. The total charges for maintenance and generally sustaining the physical efficiency of the works had been thoroughly dealt with on the present occasion. On the other side, gas and meters, stoves, and fittings had given £44,741 more, and residual products over £7000 more. The total receipts being £52,114 more, and the expenditure £51,591 in excess of a year ago, the profit was £523 up. After providing all that was required for interest and dividend, they

found themselves with a deficit of £950. He thought they would all agree that this was a fairly satisfactory statement.

LOOKING FORWARD.

Looking forward, those interested in the Company were mainly concerned with the fate of the Bill they were promoting in Parliament. By a consensus of opinion which was very much against them six months ago, it was altogether a favourable thing for them that they had gone forward with the Bill. If it were not for the Private Bills now before Parliament, he would have very poor hopes of the general legislation, with which, nevertheless, their future as a Company was bound up. However it might go with them, he was sure they had done right to go forward, as they had done, in the face of much criticism. As to the domestic coal rebate, he ventured to think that it was one of the most unfortunate of all Governmental departures. Coal used in the ordinary domestic way in an open fireplace was to the extent of practically three-quarters wasted. It did not give back the heat it should, and destroyed all those constituents which were of incalculable value to the country at the present time. Coal used industrially was not wasted, because manufacturers could not afford to waste it. Therefore the coal supplied to the industrial users of the kingdom returned a full practical efficiency. But such coal was not subject to any reduction in price. It was the domestic consumer who had coal given him to destroy, at a discount of 10s. per ton. When the matter was looked at in this light, the action of the Government was most unfortunate. Inasmuch as the gas companies had to hand on to the public almost the full measure of the rebate they received from the collieries, it would have been a wiser policy to have lowered the price of gas coal by 15s. a ton, because the coal employed in that way was used with the most exhaustive economy. Their unhappy condition to-day as a nation was due to the fact that they could not even get the coal they did before the war. But if the Government had kept the coal from the domestic consumer, and given it to those industries which used it to the fullest possible extent, they would have secured something like the equivalent of a larger coal production. This, however, was a point which had never suggested itself to the Government; and, from what he knew of them, it was never likely to so suggest itself.

The Deputy-Chairman (Mr. G. W. Carey) seconded the motion; and it was at once carried unanimously.

On the proposition of the Chairman, seconded by Mr. A. F. Phillips, dividends were declared for the half year, less income-tax, at the rates per annum of 6 p.ct. on the "B" preference stock, 4 p.ct. on the "C" preference stock, 6 p.ct. on the "D" redeemable preference stock, 7¼ p.ct. on the original ordinary stock, and 5¼ p.ct. on the "A" ordinary stock.

The retiring Directors (Messrs. G. W. Carey and J. Cash) were re-elected, on the motion of the Chairman, seconded by Mr. F. H. Jones. Mr. Lewis Hardy was re-appointed Auditor, on the proposition of Mr. A. W. Oke, seconded by Mr. K. R. Mackay; and Mr. William Cash Special Auditor, on the motion of Mr. F. Smallbone, seconded by Mr. W. Richards.

The proceedings concluded with a hearty vote of thanks for their services to the Chairman, Directors, officers, and staff; this being accorded on the proposition of Mr. W. A. Hounsom, seconded by Mr. Oke.

NORTH MIDDLESEX GAS COMPANY.

Large Increase in Gas Sales.

The Half-Yearly Meeting of the Company was held on Monday of last week, at the Offices, No. 5, Great Winchester Street, E.C.—Mr. A. M. Paddon (the Chairman) presiding.

The Secretary (Mr. E. L. Burton, F.S.A.A.) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The Chairman, in moving the adoption of the report and accounts, said that in the former the figure which represented the very important increase in the Company's business must have appealed to them. It was the largest increase in the whole history of the Company, and was, of course, due to the fact that gas had been used free from the restrictions which obtained twelve months ago. It also meant that there was very considerable vitality and progress in the Company's business, and that adequate measures must be taken to deal with this progress. The report detailed the large number of changes the Company had had to face, and which accounted for the increase in the price of gas. Of course, it was easy after events had happened to reduce them to a statement of this explicit kind; but their difficulty was of another order—that was, to anticipate what they would have to face in the immediate future, and often to deal with changes which had a retrospective effect in derangement of provisions already made. They never knew what might come upon them at a week's notice. The capital account showed that they had spent during the half year under review nearly £23,000 on plant; and, of course, it would suggest itself to the proprietors that it would be impossible to face an increase in the Company's business such as was now reported without making very important departures in the way of new plant and reconstruction of that at present employed. But there was a great deal more to spend than had been brought into account, though the half year had borne its fair share. The total capital that had been issued was £213,398, which was under £600 per million c.ft. of gas sold; and in the special circumstances of the Company, this was a low rate of capital, because the assets were considerably in excess of what might be regarded as a normal apportionment for a Company of this kind. The land held was very extensive, and the plant was of the latest description. Within the last few weeks, this plant had been subjected to one of the most drastic tests that any plant could have been called upon to undergo, when nearly the whole of the men came out on strike. If they possessed such provision as he had referred to, the proprietors must expect to a certain extent a higher expenditure of capital than where such conditions did not obtain. In the revenue account, the cost of coal, oil, and coke had increased by over £7000. Carbonizing wages at £3252 represented 3⅜d. per 1000 c.ft. sold, which, comparatively speaking, in these days was distinctly low. The items of repairs and maintenance of works, mains, services, meters, and stoves had been adequately dealt with. The total expenditure for the half year exceeded that of a year ago by £16,681. Receipts for gas and rentals of meters, stoves, and fittings were £12,667 more, and for residuals £3827 more. There were increased receipts to the extent of £16,481 to set against the increased expenditure, so that the profit was £200 less. There was carried to profit and loss account £5814, and interest on investments £204—making £6018; and as they required for dividend, interest, and income-tax £5846, there was a small surplus of £172. Loans from bankers £25,000 represented the provision they had been compelled to make for additional plant. A new holder was being put up, and the plant was being augmented and improved in other directions. As matters stood, he thought the account presented was a favourable one; but there was no arrestation in the demands the Company had to meet, and he feared they would have to raise the price of gas. It was rather hard on gas investors that they could not now get even the moderate return which Parliament accorded to them in the palmiest days before the war.

Mr. H. A. Lermitte seconded the motion, which was unanimously agreed to without discussion; and thereafter dividends were declared for the half year, less income-tax, on the preference capital at the rate of 5 p.ct. per annum, on the original ordinary capital 8¾ p.ct. per annum, and on the additional ordinary capital 6¼ p.ct. per annum.

The retiring Directors (Messrs. H. A. Lermitte and S. A. Sampson) and the Auditor (Mr. L. Hardy) were re-appointed.

THE RECENT STRIKE—CO-PARTNERSHIP ADOPTED.

The Chairman then moved a resolution in favour of the establishment in connection with the Company of the principle of profit-sharing or co-partnership. Referring to the recent strike, he said that on Jan. 31, 125 out of 130 men left their work at two hours' notice, with, he was afraid, the direct intention of throwing the district into darkness. Fortunately, however, from the first moment (owing to the resolution, skill, and devotion of their Engineer, Mr. Lawrie Trewby, and those under him) there was not the faintest indication of failure in the supply. To-day the supply was strictly normal, and in no way inferior to what it was before the strike. Now the works were staffed with a new lot of men, who were serving the Company well; and he (the Chairman) had declared unequivocally that they would not dispense with the services of any one of these men, though he was sorry to the last degree for the consequences that had attended the misguided action of the old employees. Now they must try by co-partnership to create a sound and lasting understanding between the workmen and the Company. In reply to a question as to the origin of the strike, he explained that five or six men were non-unionists; and those who went out demanded that these men should join their union, or that the Company should dismiss them. With regard to the first, the Board said it was no business of theirs; while as to the second, they replied that they would never do such a thing.

Mr. A. F. Phillips seconded the resolution, and it was carried.

On the proposition of Mr. H. F. Pardy, seconded by Mr. Thomas Glover, a hearty vote of thanks was accorded to the Chairman and Directors, the Secretary, the Engineer and staff, and all who had assisted them during the strike.

The Chairman, Mr. Burton, and Mr. Trewby returned thanks; all remarking that the staff had behaved exceedingly well. Mr. Trewby said that, as soon as the newspapers got hold of the information about the strike, the Company were over-run with labour from all parts of England. They had now an excellent body of men; and the spirit in the works was better than he had ever known it before. Each Director did all he could to help.

HARROW AND STANMORE GAS COMPANY.

Accumulated Difficulties—Doubts and Hopes as to the Future.

The Ordinary Half-Yearly Meeting was held on Monday, March 1, at No. 5, Great Winchester Street, E.C.—Mr. A. F. Phillips in the chair.

The Engineer and Secretary (Mr. Charles Chambers) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The Chairman said, at the time of the last general meeting six months ago, though the war had terminated by several months, the Company were passing through a trying time; and he then ventured to predict that the future might give increased anxiety to those responsible for the administration of gas undertakings. It was not, however, anticipated that the difficulties would be as serious as they had become. The demands of labour had greatly added to the cost. There had been much difficulty in obtaining coal, the cost of which had been further increased by the additional freight—in fact, the cost of all material required for a gas-works had gone up from 100 to 300 p.ct. To meet the additional charges, the price of gas was increased 8d. per 1000 c.ft. from Michaelmas, resulting in a further reduction of 1 p.ct. in the dividend which the shareholders were entitled to receive. The sale of gas, which was 225 million c.ft., continued to increase, and was 16·1 p.ct. more than in the corresponding half year, though it was necessary to remember that, owing to the restrictions placed on consumption, there was a reduction that half year of 3·7 p.ct. The only addition to capital account was £1005 for meters; and as the amount written-off for depreciation was £2991, there had been a reduction of £1986. The capital now stood at £333,956, which was under 11s. per 1000 c.ft. of gas sold, excluding the amount added upon conversion. Ten years ago the capital was double that per 1000 c.ft. of gas sold. The gas rental was £44,836; being an increase of £8745 on the previous year, due to higher prices and additional consumption. Coal, oil, and coke for gas making cost £26,591—an increase of £6293. Carbonizing wages amounted to £3369—an increase of £1160. Re-

pairs of works cost £1412 more. On mains, services, meters, and stoves, the additional expenditure was £3574. Rates were up £768. All other expenses were much the same; but the balance of revenue carried to profit and loss had fallen from £9784 for the December half of 1919 to £7840 for the past half year—a reduction of £1944. This profit on the half-year's working was less by £295 than the amount required to pay the charges for debenture and other interest and the statutory dividend. But, adding to it £5501 brought forward, and the interest on deposits, there was an available balance on profit and loss of £11,173, from which the dividend on the ordinary stock at the rate of 4½ p.ct. per annum and 5 p.ct. per annum on the preference stock would require £5636, leaving £5586 to carry forward. From Dec. 1 last, labour was awarded under an arbitration an additional 5s. a week; and from Feb. 15 there was an additional charge of 2s. per ton on the carriage of all the coal, and the price of oil would be increased by 3d. per gallon. The results of the half-year's working having been as efficient and economical as possible, the revenue could not bear these additional expenses; and the Directors had no alternative but to increase the price of gas 4d. to 4s. 8d. per 1000 c.ft. from Ladyday next, which would unfortunately reduce the statutory dividend on the ordinary stock by ½ p.ct., or to 4 p.ct. per annum. In accordance with the decision of the Controller of Coal Mines to allow a rebate of 10s. per ton on all coal carbonized for producing the gas required for domestic and household purposes, the allowance to domestic consumers for the current quarter ending Ladyday would be 6d. per 1000 c.ft. The allowance might vary from time to time depending on the gas used for industrial purposes, and the proportion of water gas. The Company had endeavoured to comply with the Coal Controller's request to reduce the consumption of coal as far as practical, and had during the past half year supplied 39 p.ct. of carburetted water gas.

WHAT OF THE FUTURE?

With this short account of the Company's doings for the past half year, some observations might be expected as to the future. It was difficult to forecast what might take place. It would be a time of considerable anxiety. The staff and workmen in the Company's employ were, he hoped, contented, and were loyally carrying out all their duties. The Directors had been pleased to grant the increases in their wages, as they recognized with the altered conditions it was impossible for men to live on the old rate of pay, the remuneration in the past was not a proper reward for labour; but the Directors hoped further demands would not be made, that discontent would cease, and work be efficiently and energetically carried out. Then the future of coal was most doubtful. There was an able article in the "Daily Telegraph" for Feb. 19, which most clearly set out the position of the coal supply as derived from the Government auditors' report, which was too lengthy for general reading. The article would, he was sure, convince any Englishman of the supreme importance of giving due consideration to coal, which was of such vital concern to the country. The oil employed for carburetting the water gas (which was 2½d. per gallon before the war) was now 8½d. per gallon; and notice had been given of a further 3d. rise. Retorts—such an important charge in maintenance—had gone up 200 p.ct. Meters (without which he gas could not be sold) cost 150 p.ct. more; and all other material required by a gas company had risen in the same proportion. Such additional charges could only be met by raising the price of gas; and it was the greatest hardship that every penny addition to the gas should be followed by a statutory reduction of ⅛ or ¼ p.ct. (according to the provisions of the Private Act) in the dividend which the proprietors were entitled to have. This arose from causes quite beyond their control, and was an absolute cruelty for those who had their capital, on which their living depended, invested in gas undertakings which were at one time considered to be the safest of investments, and not liable to fluctuation. The conditions under which the standard and maximum prices of gas were fixed no longer existed. Generally, they were the result of a contest before a Parliamentary Committee, and were based on the cost of labour and the prices of coal and other material at the time. The prices were fixed with a small margin, in order that, if the business was carried on efficiently, there might be a small increase in the dividend; but, if not so conducted, the dividend would fall. As all new stock was sold by auction, if the position of a company improved the stock realized a higher price. There was no possibility under any conditions of a gas company being capable of what one heard so much of—"Profiteering." The Government promised this session to introduce into Parliament a Bill to give relief to gas companies, and allow them to re-instate the pre-war dividend. It was the least that gas proprietors had a right to expect; and it was the very minimum the Government should grant, considering the great loss of interest gas stockholders had suffered during the past five years, and the assistance the companies, without any reward, gave in providing the material for the production of explosives, which were so vital for the success of the war, and without which it could not have been successfully carried on. Gas companies obtained no benefit from the work they did for the war, but sustained very considerable loss. The industry now looked to the Government to redeem the promises held out to it, that the capital invested in such important utility undertakings should receive a reasonable return. He hoped that at the next half-yearly meeting, he should have the pleasnre to announce that a satisfactory solution of their financial hardships had been obtained. Every holder of gas stock should help to obtain this relief by impressing the position on Members of Parliament and on the public generally. Certainly the Labour Party, who had so largely received of the increased expenses, should support the Bill in Parliament. The companies only asked for justice.

The VICE-CHAIRMAN (Dr. J. W. Lee Glaisher, F.R.S.) seconded the motion, which was unanimously carried.

Proposed by the CHAIRMAN, and seconded by Mr. SAMUEL CUTLER, dividends were declared for the half year at the rate of 4½ p.ct. per annum on the 5 p.ct. ordinary stock, and 5 p.ct. per annum on the preference stock, both less income-tax.

The VICE-CHAIRMAN moved that Mr. A. F. Phillips and Mr. Samuel Cutler be re-elected Directors of the Company. In doing so, he remarked that it was absolutely unnecessary for him to enlarge on the unique position Mr. Phillips held in the gas industry, and the extraordinary value it was to the Company to have his knowledge and great experience devoted to its interests. Few people knew the amount of time Mr. Phillips gave to the affairs of the undertaking. Mr. Cutler had long been a Director; and everyone knew his position in the gas profession.

Mr. A. M. PADDON, in seconding, said the passing of the motion would be conferring some recognition, which he might term almost inadequate, upon the two retiring Directors; but in any case the proprietors would be doing something of great importance in their own interests. Both gentlemen afforded the Company the benefit of their talents and the fruition of their exceptional experience. When they heard Mr. Phillips speaking just before upon matters affecting the gas industry generally, they would have realized what great value his personal influence, services, and experience were not only to this particular company, but to the great industry of which it formed in itself a not inconsiderable unit. If the proprietors knew what gas engineers and the technical profession generally accorded Mr. Phillips in the way of recognition and admiration, they would be very proud to have him as their Chairman.

The motion was heartily carried.

The CHAIRMAN and Mr. CUTLER having responded,

Mr. W. G. BEAUMONT moved, and Mr. JAMES RANDALL seconded, the reappointment of the retiring Auditor (Dr. Charles E. Goddard).

This having been agreed to, and Dr. GODDARD having replied,

Mr. F. G. PILLEY moved and Mr. E. L. BURTON seconded, a hearty vote of thanks to the Chairman and Directors and to the Engineer and Secretary (Mr. Chambers), the staff, and the employees generally.

This was heartily passed.

The CHAIRMAN, replying on behalf of himself and his colleagues, said he was glad the staff had been included with the Directors, because however attentive the Directors might be to the business, if their instructions were not carried out and their wishes seconded by an able staff, they would not succeed. He believed they had in front of them very serious difficulties, especially in regard to coal, which gave him the greatest anxiety. In his speech, he had alluded to an article which had appeared in the "Daily Telegraph," and from which could be realized the great difficulties that came upon them from coal. Among other things the writer showed that the miners raised 57 million tons less coal in a year than before the war; and another thing that struck him as remarkable was that for the 230 million tons that they did turn out, the miners received no less than 225 millions in wages, while the colliery proprietors' share was only about 13 millions. It would consequently be realized that if the miners agitated, and obtained a further increase of wages, it must come on coal, and would be a serious obligation added to the other burdens gas companies had to bear.

Mr. CHAMBERS, replying for the staff and workers, remarked that the Chairman had spoken of the contentment at the works; and he (as Engineer) was pleased to say that this was the condition that reigned there at the present time. They went through the whole of last year without any hint of a labour difficulty whatever. He thought he might say that there seemed to be something like the old-time spirit coming back. He appreciated the vote very much; and he was sure that the same could be said of the staff and the workmen.

PORTSEA ISLAND GAS COMPANY.

The Half-Yearly Meeting of the Company was held on Friday, the 27th ult., when the report submitted recommended a dividend of 7½ p.ct. on the "A" and "B" shares, 6¾ p.ct. on the "C" shares, 5¼ p.ct. on the "D" and "E" shares, and 5 p.ct. on the 5 p.ct. (maximum) stock, leaving £13,039 to be carried forward.

In moving the adoption of the report and accounts, the Chairman (Mr. T. H. F. Lapthorn) said that in the amount of business done there had been an increase. The gas sold was 898 million c.ft., an increase of no less than 130 million c.ft. over the last half of 1918, equal to 16·89 p.ct. The result of the half-year's working, after paying interest charges and working expenses, and setting aside a sum of £2258 to the insurance fund, was to leave a balance of £12,089. The dividends recommended under the present conditions would give people who had invested their money in the Company a return of about 2⅝ p.ct. Turning to the question of the price of gas, consequent on increased costs, they found themselves reluctantly compelled to advance the charge by 6d., making it 4s. 8d. per 1000 c.ft. to ordinary consumers. But since the increased sales during the last six months had had the effect of spreading the standing charges over a larger production, and thus reducing the cost per 1000 c.ft , and consequent also on the better price they had been able to obtain for their residuals, they had recently been able to announce a reduction of 2d. per 1000 c.ft. to every consumer. Beyond this, the allowance of 10s. per ton which the Government had made on household coal had enabled them to give their domestic consumers a rebate of 7½d., making a total reduction of 9½d. At the present moment an extension of their manufacturing plant was very badly needed. Plans had been prepared for an extension amounting to over £100,000; and contracts had been given to the Woodall-Duckham Company. When these extensions had been completed, they would be in a position to meet the requirements of their customers for a long time to come.

After the confirmation of the report and the declaration of the dividends, an extraordinary meeting was held for the purpose of complying with the requirements for the raising of additional capital. The Chairman said that under their Act last year the extent to which they were allowed to borrow money was increased from one-quarter of their ordinary share capital to one-third, thereby automatically increasing their power to borrow on debenture stock by £42,961; so that at the present time they had powers which had not been exercised to raise roughly a sum of £217,000. In order to enable them to raise the money they required on the most favourable terms, it would be necessary for them to rescind former resolutions, because the conditions under which the issue was sanctioned were altogether inapplicable at the present time. He formally moved that this be done.

The resolution was agreed to.

ALDERSHOT GAS, WATER, AND DISTRICT LIGHTING COMPANY.

The Annual General Meeting of the Company was held on Friday last, at the offices, Victoria Road, Aldershot—Mr. R. W. Edwards (the Chairman and Managing Director) presiding.

The Secretary (Mr. F. A. Ricketts) read the notice convening the meeting, and the minutes of the previous meeting.

The Chairman's Address.

In moving the adoption of the report and accounts and the payment of the recommended dividends,

The Chairman said: Before opening my address, I invite your indulgence for a few moments while I touch a personal note. In the printed report reference is made to the change of Chairman. Mr. Robertson's retirement calls for more than a brief record. Throughout nearly twenty-two years on the Board, there has been a progression of important events connected with the expansion of the business. With four parliamentary measures, and other notable innovations (too many to detail here), Mr. Robertson has been identified. During his period of chairmanship marked developments took place; and our regret at losing him in the chair is comforted by the fact that Mr. Robertson remains on the Board, and we trust will be so spared for many years.

The Directors unanimously elected me Chairman; and in making my maiden speech, I preface it with an appreciation of the honour, and an earnest hope that I shall fulfil your highest anticipations, which will not be for the omission of any sincere desire and aim to do my utmost, as I hope I have done for twenty-one years, to further the interests of this progressive undertaking.

To most of us 1919 will be memorable in marking the first post-war year, which opened with dreams, of which but a few have yet been fulfilled. There have been disappointments; but, in the distance, one anticipates bright visions of progress.

To proceed at this stage would be inappropriate without a brief retrospect. This undertaking stands among those claiming a front line in the prosecution of the great war. Immediately following the declaration of hostilities, we commenced operations, and on Tuesday morning, the 5th of August, 1914, our arrangements to meet what was afterwards experienced—the severest strain any undertaking of its kind could be put to—were made. We met the increased demands without one failure throughout the four-and-a-half years. As can be imagined, Aldershot being the centre of gravity for the expeditionary force, we were alive with intense activity a few hours after that memorable decision; and, shortly after the first army corps had left, Aldershot was rapidly filled with potential soldiers in the persons of the Kitchener Army. So on, throughout, there was an ever-continuous stream of soldiers in and out. Gas, water, and coke for military purposes and the Royal Aircraft establishment; toluol (we were one of the earliest to instal plant for the recovery of this necessary bye-product for explosives); and sulphate of ammonia, for the Board of Agriculture. We bent our energies to laying additional feeder-mains to the aircraft factory; fitting-up cottages at Pinehurst Estate (adjoining the factory), and, later, the whole of the Ministry of Munitions Garden Suburb of Rafborough. To meet our obligations, we reconstructed part of our existing Ash Road North Gas-Works; erected a new Ash Road South Works for oil gas; an additional pumping-station for waterworks; and last, but not least, completed and got to work our new electricity station at Farnborough, at which later, owing to the demand for current, we doubled the capacity of the generating plant.

I should like to deal more with the work done by the Company, in justice to those employees who have been associated with the heavy work; but time is precious. However, in passing, I feel that in years to come, memories will bring no reproach to anyone connected with the Company for not having done his share in the war. Apart from our efforts, many employees took service in the field—some, alas! paying the supreme sacrifice. We revere their memory, as also do we honour those who had the good fortune to return.

Now, I presume you will (as has been customary) take the report and accounts as read? In the capital account, there has been spent the sum of £27,426 17s. 3d.—largely for:

Works and plant—which represents . .	71·39 p.ct. of the total
Mains and services	8·01 ,,
Gas and water meters, and electrical transformers	10·00 ,,
Parliamentary expenses	10·6 ,,

It is hoped that in the immediate future our capital expenditure will not be so heavy, as all the works that were commenced during the war are now nearly completed.

Turning to the revenue account, I find it difficult to make comparisons; but, for simplicity, I will here and there epitomize the salient items. For instance—coal and oil, which have made such inroads into our expenditure, and the prices of which, as you are doubtless aware, are entirely out of our hands.

Since September, 1917, there have been four official increases in the price of coal, representing 12s. 6d. per ton, plus extra carriage between 5s. and 6s. per ton (caused by the transference of our Somerset contracts to the Midlands, in 1917). While to the Company, since the 15th of January last, there is a further increase due to the 25 p.ct. advance in railway freights, representing about 2s. per ton. Coupled with coal, we have had considerable increases in the price of gas oil, which, in pre-war days, cost about 2¾d. per gallon, and so late as June, 1918, we were paying 7d. on a contract which had then seven months to run. Unfortunately, the Government decided to cancel contracts, formed a Pool Board, and raised the price to 1s. 4½d. per gallon; and this remained until after the armistice, when the price of oil dropped to 9d., and has since increased to about 1s. per gallon. You will thus see what an important bearing the cost of coal and oil has on the working of a gas undertaking; and, in conjunction with this, one must take into consideration the return from residuals. Here again, we have not a free hand. The price of coke is controlled; sulphate of ammonia was strictly controlled during the war, and continues so, but more in a voluntary arrangement with the Board of Agriculture. Nevertheless, we have not the freedom we had in pre-war days in the disposal of our residuals; and this has a marked effect on the net cost of our coal. Summing up the two—coal and oil, less residuals—we find that the net expense is over three times heavier in 1919 compared with 1913.

Then, with respect to repairs and maintenance of works. We are not in the unfortunate position of many undertakings, that have been unable to keep up with their maintenance and reconstruction during the war. This we made up our minds to do—in face of supreme difficulties—and are fortunate to-day in having kept pace with our repairs and renewals. But, it is another story, when one reckons up the cost. We all know that wages have increased, in some cases well over 200 p.ct. Retorts, which in pre-war days cost about 6s. per foot, are now about 15s.; and other materials have advanced in a similar ratio. We find that the cost of maintenance in 1919, as compared with 1913, has risen in the same proportion as the net cost of coal and oil—over three times. In all expense accounts, the increased cost of materials and the high wages represent the explanation. In laying mains, cast-iron pipes, which in pre-war days cost £5 per ton, to-day range between £15 and £17; and the cost of fitting-up a house for a prepayment meter consumer is about three times higher.

Summarizing our wages and salaries paid, for all sources (capital and revenue) for the year of 1913, we paid £14,089, while for 1919 it was £36,082. Rates and insurance, principally rates (and, as regards these, there is an increase, not due to any re-assessment, but solely to an advance in the rates), in our gas department were £627 18s. 5d. more; in the water department, £258 15s.; and in the electricity department, £36 14s. 6d.—making a total increase for the year of £923 7s. 11d. Of this amount £687 0s. 8d. falls in Aldershot, for rates alone.

Coming then to the result of our gas revenue, we find that there is a balance to carry to profit and loss of £19,598 14s. 8d., as against £12,721 7s. 1d. Our Water Department has a very similar tale to tell—increased cost of materials and higher wages, and there, with a reduced revenue from a special contract—due to the cessation of hostilities—the profit is down, and the balance carried to profit and loss is £3248 3s. 10d., against £5219 14s. 4d. Then, with our junior department—electricity—the balance carried to profit and loss is £1047 7s. 4d., as against £46 12s. 6d. Over the three departments, the sum of £23,894 5s. 10d. (as against £17,987 13s. 11d.) is brought into profit and loss, and the balance carried-in meets dividends and interest for the year, with only £359 13s. 3d. over.

As explained in the report, sales of gas have had a set-back, and it is what one would naturally expect. But, notwithstanding this, the sales of gas for 1919 show an increase of over 33 p.ct. as compared with 1913.

In our water department, certain revisions in the charges are being made; and our electricity is now at the maximum price. This latter department has a most promising future; and we anticipate, with the irksome Household Fuel and Lighting Order suspended, both gas and electricity supplies will increase. Altogether, the prospects are bright, owing mainly to the fact that we have a large number of districts, many of which have not been fully developed, and, as time goes on, all will undoubtedly participate in the great building extensions which are foreshadowed over the country. When I explain to you that our statutory area, in three counties, is about 150 square miles—the largest, I believe, entrusted by Parliament to any gas undertaking—you will fully appreciate my remarks.

The conclusion of the report brings one to the dividends recommended for your acceptance. As you are aware, the rates paid to the original shareholders are controlled by the sliding-scale; and this is a matter which is giving us much concern, as well as most gas companies. The standard or initial price is the pivot or centre of gravity, from which the dividend varies, as a price for gas which is in sympathy with current economic conditions and values, and has regard to immediate existing interests. At this standard price—in our case 3s. 8d.—a standard dividend is paid, of 5 p.ct. on our "A" stock, and 3½ p.ct. on our "B" stock. When gas is sold below 3s. 8d., there is a reward or increase in dividends of 1s. 6d. p.ct. for every penny reduction, while when above 3s. 8d. a penalty is inflicted of 1s. 6d. p.ct. reduction for every penny increase. This is all very well in normal times, when money values remain undisturbed; but the position to-day is quite different. If the Government had ordered that everything should be increased 100 p.ct., and neglected these standard gas prices, it would be monstrously unfair; for, apart from loss of dividend, there would be a heavy capital depreciation. The Government have not done this; but the value of money has altered to even more than 100 p.ct. difference. Therefore, as in wages, so in capital, there must be a re-adjustment based on these new values. A standard which was a fair basis in pre-war days obviously must be substantially altered to correctly represent present-day money values. We understand the Government have some such measure in preparation; and that it will be introduced in the present session—after Easter. We feel that the time has really passed, and that this ought to have been done much sooner; for it has very seriously interfered with the financial position of gas companies, not only with regard to reduced dividends and depreciation of capital, but it has meant, where new capital has been raised, a very serious handicap in obtaining the money, except at high rates of interest.

A Bill has been introduced in Parliament, called the "Public Utility Companies—Capital Issues Bill," the object of which is to give all statutory gas and water companies the same facilities for raising capital by preference or debenture stock which have during recent years been given to many companies by Parliament. In our case, some of the provisions were obtained so far back as 1909, as instance the raising of capital below nominal value; and again in 1918 we obtained powers to issue redeemable preference and debenture stocks. The other provisions in the Bill I refer to provide for increased interest on preference and debenture stock, and power to increase the ratio of loan capital, which, as you know, is in some cases one-fourth, and in others one-third, of the capital called up. But under the Bill it is proposed to increase this ratio to one-half. It has been described by

some critics as the first instalment of financial relief; but my view is that, as an instalment, it should have been second, for it stands to reason that new capital cannot be raised to any reasonable extent until the financial disabilities under which gas companies are suffering have been removed. It is no use inviting the gas investing public (which is a category by itself) to subscribe for new capital when a great proportion—one might say all—are suffering from loss of dividends and heavy capital depreciation. I recently saw a letter from a regular gas investor, who, on being invited to take up some more stock, replied with the remark that he did not intend to put any further money into gas. The serious prejudice which really exists to-day, from circumstances beyond the control of gas companies, has got to be overtaken; for the economical production of gas is based primarily on cheap capital. How often, in pre-war days, have we seen a gas undertaking efficiently managed, but crippled because of its high capital ratio?

In conjunction with the Government Bill, anticipated after Easter, there are expected to be incorporated provisions which will have a very radical effect on the operations of gas undertakings in future. Up to now, gas has been sold by volume—*i.e.*, at so much per 1000 c.ft. It is proposed that gas shall be sold on a heat basis—*i.e.*, by the amount of heat contained in the gas. This will be fair and reasonable; for gas is now used but very little as a direct illuminant—one might almost say, nearly entirely as a heat agent. Gas light is largely obtained to-day by the heating of a mantle to incandescence. The unit of heat (or, in other words, the "British Thermal Unit") is the amount of heat that will raise 1 lb. of water 1° Fahr. in temperature, and will be the basis on which the quality of the gas is determined. The idea is that the standard should represent 100,000 B.Th.U.—to be called a "Gas Therm;" and the Bill will require gas companies to declare to the Board of Trade, and the public authorities interested, the calorific value of the gas to be supplied from time to time. Naturally, there will be certain provisions for checking the quality, which I need not enter into at this stage; but the Company will be able to vary the calorific value from time to time, on giving proper notice. There will also be provisions limiting the proportion of inert constituents in the gas, as well as the minimum pressure to be maintained in the mains.

This Bill will naturally mean much consideration to gas manufacturers. It is a fresh charter, and one which, I believe, the gas industry welcomes—feeling that there is a new field, with big scope for development, and that with enterprise, both in the adoption of the latest plant and labour-saving machinery, coupled with the provision of economical and efficient apparatus to the consumer, there should be, as time goes on, very few establishments of any description without gas being used in some way or another. There is no doubt that if the price of gas is to have a downward tendency in the future, it must be brought about by enterprise and resource, and by constantly reviewing and revising manufacturing plant, so as to obtain the best results consistent with strict economy. We may then hope to arrest and overtake the rising costs of materials and labour. I am quite sure that most of our employees appreciate this, as any innovations that have been introduced into our various works have always been met in the right spirit, for practically the whole of our staff and permanent workmen are co-partners. Their interests are associated with the shareholders in the sliding scale, as the amount of bonus is identical, above the standard price of gas, with that paid to the "B" stockholder.

On this point I am convinced that, as time goes on, co-partnership will be one of the greatest safeguards in our relations with labour. It will maintain that confidence which is so essential, and increase that spirit of enthusiasm from one end of our business to the other. For their sakes, as well as the shareholders, we look to early relief in regard to the sliding scale.

One point I should like to make is this. There is an inclination to describe any suggestion as to the revision of dividends as a capitalistic programme. This is quite untrue; and I feel sure that if the share capital of the various gas companies throughout the kingdom could be analyzed, it would be found that the average holding per shareholder represented about £300 or so, which goes to show that the capital in the gas industry has been largely subscribed by thrifty people, who doubtless placed their savings in this class of investment year after year as it accumulated. I believe I am right in making this statement; and so the people who have been hit are by no means wealthy, but those in very modest circumstances, who can ill-afford such a great sacrifice in these days of increased expenses. On this point alone, I hope Parliament will lose no time in bringing about the desired reform.

The dividends that are commended in the report represent, with those paid for the June half year, an average over the year, on the "A" stock of £3 8s. 6d. p.ct.; and on the "B" stock of £1 18s. 6d. p.ct., which are respectively 6s. 6d. p.ct. and 14s. p.ct. below the three-quarter standard. My object in explaining this is that your Directors did not consider it in the interests of the Company that they should apply under the Temporary Increase of Charges Act for financial relief to pay the miserable three-quarter's standard dividend. This is a three-sided Company—gas, water, and electricity—and many considerations entered into the question. Furthermore, in view of the Government proposals (which were anticipated to be introduced in the autumn of 1919), it was felt advisable that matters should remain as they were, which will possibly be but for a short time, whereas the relief provided for in respect to the sliding-scale capital could not have been obtained without a corresponding effect upon the other classes of stock, and this would have been detrimental to the raising of new capital.

I ought to refer to the remarkable action of the Government in earmarking a 10s. reduction in the price of coal for domestic purposes, which applies to gas. Apart from the difficulties in distinguishing between gas used for domestic purposes and gas used for industrial purposes, there is the injustice to the stockholders under the sliding-scale. A general reduction would have been much more equitable and acceptable, even if only one-half or one-third the amount. As the greater proportion of our gas is for domestic use, it means that the remainder, about 10 p.ct., controls the sliding-scale. This is, of course, ludicrous; but nevertheless it is so under this extremely exceptional order. Then again, only a proportion of our gas is manufactured from coal; so that the ratio is a proportion of coal to the total domestic gas, which we estimate represents a rebate this quarter of 6d. per 1000 c.ft., but (as provided in the order) is adjustable *pro* or *con* in subsequent quarters.

Before I submit the resolution for your adoption, I would make two further personal references—one in respect to Mr. Edward Davis, one of our Auditors, who unfortunately died on the 10th of September last. You will be asked in a subsequent resolution to appoint Mr. Arthur Edwin Cutforth in his place, who with Mr. Maltby (both of the firm of Messrs. Deloitte, Plender, Griffiths & Co.) will be the Company's Auditors. We regret the loss of Mr. Davis. There will also be a resolution submitted, asking for the payment of the full Auditors' fees for the year; and this I am sure you will agree to, as the whole of the work has been done by Messrs. Deloitte, Plender. There is another matter, and that is the loss of our Secretary, Mr. Fish, who had been with the Company some eight years, and was appointed Secretary in August, 1917. Mr. Fish has taken up a similar position with a large firm of motor engineers. During the short period he occupied the position of Secretary, he rose to our highest anticipations; and while we regret his departure, he has our best wishes in his new sphere of life. Mr. F. A. Ricketts, who came to us last June from Taunton, has been appointed to succeed Mr. Fish.

I now formally move: "That the Directors' report with the statement of accounts for the twelve months ended the 31st of December, 1919, be and are hereby adopted, and the dividends as therein recommended be and are hereby declared to be payable to the proprietors on the 1st of April, 1920."

The DEPUTY-CHAIRMAN (Dr. F. Stroyan, J.P.) seconded the motion.

The resolution was put and carried unanimously.

The CHAIRMAN expressed gratification that no shareholder had any criticism to make.

Proposed by the CHAIRMAN and seconded by Mr. F. E. ELLIOTT, Mr. C. P. Crookenden, F.C.A., was re-elected a Director.

Mr. WM. FISH then proposed, and Mr. JAMES EDWARDS seconded, the appointment of Mr. A. E. Cutforth, F.C.A. (of Messrs. Deloitte, Plender, Griffiths, & Co.), as Auditor of the Company. It was also resolved—Mr. J. URQUHART proposing, and Mr. WM. HUNTLEY seconding—to pay full Auditors' fees for the year, notwithstanding the death of Mr. Edward Davis.

Proposed by Mr. W. WHITEHEAD and seconded by Mr. H. MITCHELL, a hearty vote of thanks was accorded the Chairman, Directors, and staff, for their conduct of the Company's affairs.

The motion was warmly supported by Mr. ALFRED WOOD, and Mr. WM. FISH, who said that, as a shareholder, he would like to associate himself with the vote of thanks to those with whom he had lately co-operated and who, as he knew from inside experience, so well merited such thanks.

The CHAIRMAN, Mr. W. T. ROBERTSON, J.P., C.C. (for the Directors), and Mr. A. V. BARRACLOUGH, Gas and Water Engineer (for the staff), expressed their appreciation.

This concluded the ordinary business of the meeting.

At the subsequent extraordinary meeting, sanction was given—on the motion of the CHAIRMAN, seconded by Dr. STROYAN—for the issue of £25,000 of share capital and one-third loan capital.

Concrete Pipes.

The Stanton Iron-Works Company, Ltd., have decided to take up the manufacture of ferro-concrete pipes, and are proceeding to put down large works adjoining their iron-works at Stanton for the manufacture of pipes under the Hume patents—ranging in size from 4 in. up to 60 in. diameter. While it is not anticipated that the future adoption of cast-iron pipes will be reduced, it is believed that the concrete pipe will make possible developments which otherwise would be seriously retarded—due to the continued high cost of iron. The new works at Stanton are being laid down to give employment to several thousand additional workmen. The Hume pipe has been manufactured on a commercial scale in Australia for some ten years past; and large works have more recently been started in South Africa and in India for the purpose of meeting the requirements of these countries. It may be recalled that the Stanton Company some time ago acquired the British rights of the De Lavaud process of centrifugally casting iron pipes; and new works are at the present time being laid down by them for working the process.

Provan Coal Handling and Carbonizing Plant.—The Glasgow Corporation last August entered into a contract with the Woodall-Duckham Company for the erection at the Provan gas-works of a coal handling and carbonizing plant, of 1356 tons of coal per day capacity, and the waste-heat boilers, at a cost of £524,011. Owing to alterations on the original scheme, the total amount of the contract is now £565,067, an increase of £41,066 over the original amount. The Gas Committee have instructed the Town Clerk to accept the amended offer.

Gas Supply of Stockton-on-Tees.—The Mayor (Mr. J. M'Naughton), at a meeting of the Stockton-on-Tees Town Council last Tuesday, said the Gas Committee had given very careful consideration to the future policy to be followed at the gas-works. The new Manager (Mr. W. W. Atley) held out the hope that in the near future they would be able to reduce the price of gas by fully one-half, so as to bring it more in line with that prevailing in neighbouring towns. Alderman F. T. Nattrass drew attention to passages in the final report of the late Manager (Mr. M. Dunn), in which it was stated that the quality of the gas supplied to the town was much in excess of the standard prescribed by the Board of Trade, and in no instance of complaint had it been found that the fault was attributable to the department, but was due to defective gas-fittings, dust-choked and inferior burners, or partial stoppage in the house services. Alderman Nattrass declared that his experience was that the gas supplied was consistently bad, or, at any rate, the light from it was unsatisfactory. He asked if some statement could be made accounting for this state of affairs. Mr. Barclay said that one of the reasons for the bad quality of the gas was the type of coal they received from which to produce it.

CONSOLIDATED GAS COMPANY OF NEW YORK.

Report for the Year 1919.

The Annual Meeting of the above-named Company was held on Jan. 26, when (as usual) a very exhaustive report—compared with any submitted by an English Gas Company—was presented to the proprietors. Some of the most interesting paragraphs from the point of view of "JOURNAL" readers are appended.

The Directors said: It was predicted in our report last year that, notwithstanding the termination of the war, the earnings of the Company from its gas business would be impaired still further during 1919 than during 1918, by the high cost of labour and materials and other elements of cost. The results were, in fact, worse than was anticipated—due not only to the fact that increases in the cost of materials and labour which occurred progressively during the year 1918, and which affected only a part of that year, affected the entire year's operations in 1919, but to the fact that the prices of materials, which during the first few months of 1919 took a downward trend, increased as the year advanced, until at the close of the year the prices of many materials (including gas oil) were higher than at any time during the war. Likewise demands on the part of labour for higher rates of pay did not terminate with the ending of the war, but continued during 1919, and are still continuing. As the result of these conditions, the cost of manufacturing and distributing gas is substantially higher to-day than it has been at any time since war was declared in Europe; and there is no prospect of improvement in the conditions affecting such cost.

The total increase in the operating expenses of the Consolidated Company alone, due to the increase in the rate of wages paid and in the price of coal, gas oil, and other materials and supplies, and to the increase in taxes and to the greater quantity of gas sold, amounted to $2,282,081. The experience of the affiliated companies has been similar.

The total increase during 1919, in the combined operating expenses of the gas and electric companies, amounted to $6,234,409, after allowing for a decrease in taxes of $784,207, of which $3,301,425 was due to the greater quantity of gas and electricity sold.

The total increase in the combined operating expenses for 1918 over 1917, and for 1917 over 1916 (as stated in the last annual report), amounted to $6,840,970 and $9,336,003, respectively. The total increase in the operating expenses for 1919 over 1916 amounted, therefore, to $22,411,382. About 70 p.ct. of this may be attributed to increased expenses and taxes due to the war; the balance being attributable to the greater quantity of gas and electricity sold.

COAL AND OIL PRICES.

The oil contract, referred to in the last report, which ran for one year, gave the option of cancelling it at the end of six months. During the spring there was a slight reduction in the prevailing market price of oil; and in March advantage was taken of this to negotiate a new contract for the period from April to December, at a reduction from the contract price of 7½ c. per gallon to 6 c. per gallon. In November, negotiations for the supply of gas oil for the year 1920 were taken up, and a contract was consummated in December for a supply of oil to the Consolidated Company and its allied companies for the period from January to June, 1920, at 7 c. per gallon—the companies having an option to renew the contract for a further period of six months. In view of the upward trend in prices of gas oil, this contract assures an adequate supply at a price substantially below the market.

The increase in the cost of gas oil will, it is estimated, add during the year 1920 $565,000 to the gas manufacturing costs of the Consolidated Company and its allied Companies. It will amount to approximately $315,000 in the case of the Consolidated Company alone.

The proceedings to review the validity of the 80-c. rate (referred to in the last report) are still pending, notwithstanding the fact that the complaint was filed in the Federal Court early in January, 1919. Hearings before the Master, appointed by the Court to take evidence and find the facts, could not, under the directions of the Court that time must be allowed the defendant public authorities for preparation, be begun until July 15, 1919. The presentation of the Company's evidence was concluded on Dec. 31, 1919. Defendants—the Attorney General, the District Attorney (represented by the Corporation counsel), and the Public Service Commission—are now presenting their evidence. It is expected that the case will be concluded at an early date; and the Company believes that the evidence submitted in the case justifies a favourable decision.

Notwithstanding the fact that there has been no evidence of any shortage in the supply of anthracite coal for domestic purposes this winter, the maximum day's output of the Consolidated Company and of its allied Companies, which occurred on Dec. 18, amounted to 172,249,000 c.ft., which exceeded that of the winter of 1917-18 (160,077,000 c.ft.) by 12,172,000 c.ft., 7·60 p.ct. It exceeded the maximum day of the winter of 1918-19 (134,216,000 c.ft.) by 38,033,000 c.ft., or 28·38 p.ct. The weather which prevailed during the winter of 1918-19 was comparatively mild. The low temperatures prevailing during the winter of 1919-20, on the other hand, have been such as to make sustained demands on plant capacities; and the consequent increase in the maximum day's output is largely attributable also to further growth in the popularity of gas as fuel for domestic heating purposes. As a matter of fact, the demand for domestic heating appliances during the present winter has exceeded the supply—showing the extent to which gas is displacing coal for house-heating purposes.

CAPITAL EXPENDITURE.

During the war period, the Company has felt constrained, both as a matter of sound business policy and as a matter of compliance with the counsel of the national authorities, to keep capital expenditures to a minimum. The increase in the maximum day's output has, however, diminished the combined reserve manufacturing plant capacity to so great an extent that it is now deemed imperatively necessary to increase the available plant before next winter, as a severe winter (especially if coupled with coal shortage) might easily add from 20 to 30 million c.ft. to the maximum day's demand. To this end, a contract has been made for the erection of an additional water-gas plant at Astoria, having a daily capacity of 30 million c.ft. It is expected that this can be completed by December.

The increase in the maximum day's send-out, as compared with the increase in the annual sales, has been disproportionate for the past few years. For example, the maximum day's send-out in 1914 in the Borough of Manhattan, The Bronx, and in Long Island City was 105,335,000 c.ft., and the sales for that year were 27,755,241,000 c.ft., thus indicating that the sales were equal to 264 days' use of plant capacity equal to the maximum day's send-out. This winter the maximum day's send-out in the same territory was 163,404,000 c.ft. and the gas sold in 1919 amounted to 31,262,995,000 c.ft.; this being the equivalent of only 181 days' use of plant capacity equal to the maximum day's send-out. The increase in the maximum day's output was 55 p.ct., while the increase in the annual sales was only 12·6 p.ct. Common prudence demands that the working capacity of the manufacturing plants shall be kept such as to include a sufficient reserve above the recorded maximum day's send-out to ensure continuity of service in the event of an accident, and to take care of an increase in the maximum day's send-out. Such increase between seasons has been shown to exceed 28 p.ct.

It is obvious from the foregoing that the carrying cost of manufacturing plant, expressed in terms "per thousand c.ft. of gas sold," has increased, and that owing to the growing demand for gas as fuel for house-heating purposes, and the comparatively brief winter season during which the manufacturing plant in which the Companies are obliged to invest their capital in order to meet this demand is used, will continue to increase.

A large number of employees of the Consolidated and its allied Companies, who were engaged in the various phases of war service for the Government, returned during the year; and the Companies were able in every case to reinstate them in the same positions as or better than those they had previously occupied.

During the year, provision was made for the removal of the toluol and carbon plants which had been erected by the Government upon the Company's property. This was done in accordance with the terms of the several contracts with the United States Government. At the present time, four of the plants have been partially dismantled; and the Ordnance Department is now inviting bids for the purchase and removal of all the plants and equipment.

WORK AMONG THE CONSUMERS.

The gas sent out by the Consolidated and its allied Companies, during the year 1919, exceeded the quantity sent out during the year 1918 by 2·69 p.ct. The extreme variations in the monthly output occurred in January and December. In the former month, the decrease in the output compared with that of January, 1918, amounted to 12·09 p.ct.; and in the month of December, the increase in output above that of December, 1918, amounted to 21·76 p.ct. The output in December, 1918, was below the output in December, 1917, by 7·37 p.ct.

During the year 1919, the Consolidated Company and its allied Companies installed 211,085 appliances; and there were surrendered to the Companies 62,395—leaving a net increase of 148,690 in the number of appliances in use, which have been installed by the Companies, as against the net increase in the previous year of 107,414. The net increase in 1919 included 4065 hotel and restaurant appliances, 3414 industrial appliances, 4133 gas-fired steam-radiators, and 25,012 miscellaneous gas-heating appliances.

During the year 19 gas-appliance experts made 42,882 inspections of hotel and restaurant installations, in order to insure satisfactory service from the appliances in use; and 38 women demonstrators made 164,206 inspections of appliances in the homes of customers.

Notwithstanding the practical suspension of new building operations, there was a net gain of 34,925 in the number of domestic appliances installed during the year—due, primarily, to the conversion into apartment houses of a large number of private dwellings.

A special Domestic Gas-Iron Campaign was conducted during May, June, and July, resulting in the installation of 22,143 domestic gas-irons—an increase over the number installed in the 1918 campaign of 7881 irons, or 56 p.ct.

The Architects' and Builders' Service Division has rendered excellent service by keeping in close contact with architects and builders, and arranging for adequate gas-piping in all new and altered buildings. It is found that the close relationship established between this and the other divisions of the Gas Appliance Department has enabled the salesmen to quickly get in touch with prospective users of appliances; and it is anticipated that this arrangement will be of unusual value to the various divisions of the Gas Appliance Department when new building operations are resumed.

The work of testing and developing gas-appliances performed by the Utilization Department has enabled the Companies to offer to the public only the best and most efficient gas-consuming appliances.

Successful installations were made of a special industrial burner developed by the department for brass and soft-metal melting, cocoa-roasting, commercial baking, chemical processes, and very large industrial work requiring the solution of difficult problems. This burner has also been successfully installed in a great many bake-ovens designed for the use of coal as fuel. In the brass-melting industry alone (which has been only partly canvassed), it is estimated that the consumption of gas is approximately 30 million c.ft. per year. This and similar industries offer a most desirable market for our product, inasmuch as they not only are large consumers but also operate generally during the entire year.

Gas-fired industrial steam-boilers have been considerably improved by equipping them with an automatic water-feed regulator, which renders their operation more satisfactory, and reduces the cost of maintaining them.

The development of house-heating systems using gas as fuel has been so successful that many coal-boilers are being displaced by gas-boilers, the demand for which is rapidly increasing. Fire-place heaters of the radiant type likewise have proved so successful that new designs are being developed.

The cast-iron sectional automatically regulated gas-boiler of the house-heating type has been successfully applied to hot-water supply systems, and has been developed to such an extent as to make it available where only 200 or 300 gallons of hot water per day are required, as well as where the demand is for many thousands of gallons daily. Several very desirable installations have been made where the gas-boiler is connected to the coal-boiler piping—gas being used in the summer and coal in the winter when additional steam is required for heating. This is particularly desirable business, since it adds to the summer load without contributing to the peak winter demand. Heretofore, it has been impossible to do satisfactory automatic storage heating on a large scale, because of the fragile nature of the automatic regulators available.

At the Ravenswood plant of the New Amsterdam Gas Company hydraulic devices have been substituted for the manual operation of the water-gas generator valves, resulting in a gain in gas production and a diminution in labour.

CANDLE POWER *v.* CALORIFIC VALUE.

The Company are still handicapped by the statutory obligation to work under the old candle-power standard, which has been characterized by the defendants' principal engineering expert in the pending suit as no less than "a crime," adding greatly to the cost of making gas with no corresponding benefit to the consumer. In England, a moderate calorific standard has been in vogue for some years—no records of candle-power having been shown in the returns of the English gas companies since the year 1915. In the more progressive States and cities of America it is rapidly receiving the sanction of the public authorities; and it is to be hoped that in the near future a change from a candle-power to a calorific standard will be authorized for the City of New York.

SHORTAGE OF MANUFACTURING MATERIAL.

Owing to transportation difficulties, the Company was unable during the year 1919 to maintain its customary stock of anthracite coal. Its stock of bituminous gas-coal was also greatly depleted, as the result of the severe harbour strike in the months of March and April. Since then, because of the bituminous coal strike it has not been able to secure the tonnage necessary to replace the loss due to this cause. The situation would have been more serious if the Company had not had contracts with operators in fields which were not affected by the general strike. Notwithstanding the efforts being made, with the help of the State and Government authorities, to secure an adequate supply of bituminous gas coal, our stock is practically at the lowest point in the history of the Company.

Similar difficulty has been experienced in procuring steam-coal in sufficient quantity and of proper quality for the operation of the power plants of the New York Edison Company and the United Electric Light and Power Company, and has been the source of continued anxiety. The diversion of coal by the Government, for emergency use elsewhere, made it impossible to maintain at its proper quota the coal reserve located across the Hudson river. The shortage at no time, however, reached such a point as to constitute a serious menace to the continuity of operation.

In the early part of the year there was a slight decrease in the cost of materials; but in April there was an upward trend, which has continued to the present time—evidencing a new price level.

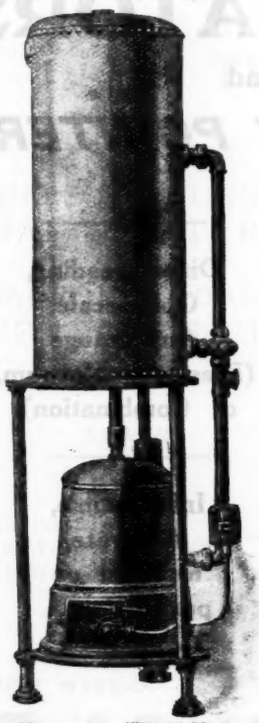
The Company has had considerable difficulty in securing deliveries of materials—due mainly to the fact that the stocks of the manufacturers were low, because of diminished production. With the demand steadily growing heavier, there is no prospect of conditions improving in the near future.

INCREASED BUSINESS.

The gas sales of the Consolidated Company increased during 1919, as compared with the previous year, by 547,195,300 c.ft., or 3·04 p.ct. In 1918 there had been an increase in gas sales of 6·74 p.ct., as compared with the previous year. Its gas sales and those of its allied Companies in the Borough of Manhattan increased during the year by 747,079,400 c.ft., or 3·01 p.ct., compared with a 6·63 p.ct. increase in 1918. In the Borough of The Bronx the loss during 1919 in the volume of sales amounted to 58,646,400 c.ft., or 1·20 p.ct., as compared with a gain of 6·28 p.ct. in 1918 over the previous year. The combined sales of the Consolidated Company and its allied Companies in the Boroughs of Manhattan, The Bronx, and Queens, and in Westchester County amounted to 686,594,100 c.ft. more in 1919 than in 1918—a gain of 2·08 p.ct., as compared with a gain of 7·18 p.ct., in 1918 over the previous year.

The difficulties in securing a dependable coal supply experienced by large buildings having private electric plants, resulted in the shutting-down in 1919 of 58 of these plants and the installation of central station service. A marked increase was also experienced in the number of such plants applying to the Company for "break-down" or auxiliary service—49 new contracts for this service having been taken during the year. A noticeable increase in the demand for electric service for industrial purposes has taken place during the year, particularly in the outlying sections. Many of the establishments which were engaged in the production of war supplies are now employing their manufacturing facilities in the production of other commodities. The demand for electrically operated household appliances and equipment of all kinds has greatly expanded, indicating that the public is availing itself very generally of the low maximum rates at which electric current is supplied.

The municipal street-lamps on the lines of the Consolidated Company and its allied Companies on Dec. 31, 1919, consisted of 7152 incandescent gas-lamps, one open flame gas-lamp, 386 electric arc-lamps, and 67,929 electric incandescent lamps—a total of 75 468 street-lamps. The total number of gas-meters in use at the end of 1919 was 976,727; and of electric-meters, 408,227. The combined sales of gas of the various Companies during the year were 33,674,972,000 c.ft., an increase over the previous year of 2·08 p.ct. The sales of electric current during the year amounted to 865,388,322 KW.-hour, an increase over



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the previous year of 14·37 p.ct. The taxes charged against the earnings of the Consolidated Company and its allied Companies during the year, amounted to $7,747,265, as compared with $8,534,319, charged against the earnings of the preceding year. There were expended during the year for additions to, and extensions of, the producing and distributing plants of the various Gas and Electric Companies the sum of $8,613,228. At a cost of $6,226,397 for repairs and $2 937,809 for renewals (or a total cost of $9,164,207) all these gas and electric properties have been maintained at the highest possible point of operating efficiency—thus insuring a uniformly satisfactory quality of gas and electricity, and their economical production and distribution.

The following is a condensed statement of the assets and liabilities of the Company at Dec. 31:

Assets.	
Fixed assets, including land, plant, and equipment	$54,550,283.51
Bonds and stocks of, and advances to, affiliated companies and other investments	115,283,895.68
Bonds and mortgages	443,000.00
Cash	2,142,967.54
Accounts receivable	2,428,817.85
Material and supplies	1,284,045.48
	$176,133,010.06
Liabilities.	
Capital stock	$100,000,000.00
Convertible debentures	24,278,772.50
Accounts and bills payable and accrued charges	9,200,099.68
Stock premiums	13,918,878.23
Renewal and reserve funds	12,851,107.27
Profit and loss	15,884,152.38
	$176,133,010.06

The figures thus far available respecting the Company's operations for the year 1919 indicate that the loss from its gas business during the year amounted to at least $1,853,759. The rentals derived from the use by others of properties not wholly devoted to the gas business of the Company yielded $250,731. The dividends and interest, applicable to the year 1919, received on stocks, bonds, and other obligations, and on advances made to affiliated Gas and Electric Companies, operating in the Boroughs of Manhattan, Queens, and The Bronx, and in the County of Westchester, amounted to $7,198,884. The interest, which accrued during the year on funded and other debt, chargeable against earnings, amounted to $1,483,436. Dividends were paid during the year on the Company's capital stock at the rate of 7 p.ct. per annum, amounting to $7,021,796. The excess over income of interest and dividends paid resulted in a charge against the profit and loss account of the Company amounting to $2,909,356.

A strike of Swansea gas-works clerks has been settled by the Directors conceding a 40 p.ct. advance in salaries.

SCUNTHORPE GAS-WORKS EXTENSION.

Scheme Approved by the Council.

The Scunthorpe and Frodingham Urban District Council have unanimously agreed to recommendations of the Gas and Lighting Committee, who, having considered a report by Mr. W. Doig Gibb, O.B.E., M.Inst.C.E., upon the scheme of the Gas Manager (Mr. S. Moore) for the erection of new gas-works urged the Council to adopt the proposals, and to apply to the Ministry of Health for powers to borrow £200,000 for the erection of the new works. The Council authorized the Committee to proceed immediately to invite tenders.

In submitting the lay-out plan and approximate estimates for the erection of a modern gas-works on a site at Dawes Lane, purchased for the purpose four years ago, Mr. Moore stated that the site was excellently situated for the economical handling of materials, and the altitude is well-suited for efficient gas manufacture and distribution. The present works were incapable of any longer meeting the rapidly growing demands for gas, and unsuitable for permanent extensions. There were weighty objections to the spending of a large sum upon the erection of new gas-works; but such a course was now unavoidable if an adequate and satisfactory supply of gas was to be provided. The main objection was based upon the idea that the new standing charges would necessitate a large increase in the price of gas; but he was quite satisfied that the economies to be secured by a modern system would fully meet all the charges out of revenue from the beginning, and all increases in output would thereafter reduce the proportionate standing charges. At the present rates for coal, residuals, and labour there would be no need to increase the price of gas to the consumer because of the proposed expenditure upon new gas-works; but the consumer would directly benefit by the increased reliability of his gas supply and the probability of a reduction in the price of gas from time to time as the output developed. Another reason advanced against the erection of new gas-works was the probability of competition with a public supply of electricity. His own experience elsewhere was that there was room for both gas and electricity; but if there should be active competition between the two commodities, it would not be the gas-works that would suffer. Mr. Moore then gave a summary of his proposals for the first and second year, pointing out that during the first year there would be comparatively heavy payments due to contractors, without any income from the new works; but the value of the old site and the buildings thereon would more than balance this unremunerative constructional period.

In his report on the scheme, Mr. W. Doig Gibb says he is able to approve of Mr. Moore's proposals, and, further, to state that they represent sound modern knowledge and a due appreciation of the necessity for keeping down working costs. I approve generally of Mr. Moore's report, as also of his two years' programme, his estimates,

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and his estimated working costs of the new plant. . . . I have studied your engineer through consideration of his work of the past year, of his proposals for the new plant and lay-out of works, and by technical discussion with him. I believe he is competent to carry out successfully the erection of new works, the laying of a new system of arterial mains, and the transference of gas making from the old works to the new. He (Mr. Gibb) had suggested certain alterations and modifications, which would no doubt be incorporated in the finished "lay-out" plan; but he did not wish, on this account, to depreciate the excellence of Mr. Moore's proposals, for to do so would be to give his (Mr. Gibb's) suggestions undue importance. Mr. Gibb advocated the immediate erection—temporarily at the old works—of a second set of water gas plant, 300,000 c.ft. capacity per 24 hours, as being absolutely necessary to carry them over next winter; and it was the only gas-producing plant which could be finished in time. The plant would afterwards find a place in the new works.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *March* 8.

The demand for all tar products is brisk, and prices continue on the upward grade. Pitch is firm at not below 115s. per ton net f.o.b. makers' works. Creosote is from 10d. to 10½d. per gallon net and naked. Pure benzol and pure toluol are about 3s. per gallon, and solvent naphtha about 3s. 6d. per gallon. Pyridine is in demand; but makers are disinclined to sell, as higher values are expected. In sulphate of ammonia, there is nothing new to report.

Tar Products in the Provinces.

March 8.

The average values for gas-works products during the week were: Gas-works coal tar, 71s. 6d. to 76s. 6d. Pitch, East Coast, 115s. to 120s. per ton f.a.s.; West Coast—Manchester, 110s. to 115s.; Liverpool, 110s. to 115s.; Clyde, 115s. to 117s. 6d. nominal. Benzol 90 p.ct., North, 2s. 3d. to 2s. 4d.; crude 65 p.ct. at 120° C., 1s. 5d. to 1s. 7d. naked at makers' works; 50-90 p.ct. naked, North, 2s. 2d. to 2s. 4d. Toluol, naked, North, 2s. 5d. to 2s. 6d. nominal. Coal tar crude naphtha in bulk, North, 10d. to 10½d. Solvent naphtha, naked, North, 3s. 3d. to 3s. 4d. Heavy naphtha, North, 3s. 2d. to 3s. 3d. Creosote, in bulk, North, liquid, 10½d. to 10⅝d.; salty, 7d. to 7½d. Heavy oils, in bulk, North, 11½d. to 1s. Carbolic acid, 60 p.ct., 3s. 3d. to 3s. 6d. Naphthalene, £22 to £25; salts, £7 10s. to £8 10s., bags included. Anthracene, "A" quality, 7½d. to 8d. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

Tar Products.

There is no particular change in either conditions or quotations to be noted since last report. Pitch seems to be quieter at the moment; and buyers are evidently not taking kindly to the new range of values. Supplies, however, are none too plentiful, and sellers are not anxious to quote, as the future is "wropt in mystery." A sale is reported from Manchester at 125s. per ton f.a.s. It is suggested that higher prices could be obtained; but the general view is to "go easy" for the present. Creosote is in considerable demand, in spite of high prices. Having arranged to use this fuel when prices were lower, users cannot readily go back to coal, which is also more expensive, although creosote at 10d. to over cannot be a very profitable material to use. Quotations of 10½d. and 11d. are reported, and in one instance 1s. was asked; but it seems doubtful whether the last-named price has been actually paid. There is a steady market in solvent naphtha, but no definite change in price. Values are expected to remain firm for some time; the current figure being about 3s. 7d. per gallon. Heavy naphtha is 3s. 2d. per gallon. Naphthalenes are steady on a fair demand. Crudes are dearer, and refined also; while for balls £45 to £48 per ton can be obtained. Benzols and toluol are unchanged. Cresylic acid is a shade dearer; but there does not appear to be any alteration in carbolics. Intermediate products are difficult to obtain on spot, and makers are not anxious to quote forward, in view of the uncertainties of the situation.

Latest quotations are as follows:

Benzol: 90% London 2s. 4d. to 2s. 5d., North 2s. 3d. to 2s. 4d.; 50-90% 2s. 2d. to 2s. 3d. London, 2s. 1d. to 2s. 2d. North; crude 60-65%, 1s. 5d. to 1s. 7d.; pure, 3s. per gallon naked.

Crude Tar: London, 62s. 6d. to 67s. 6d.; Midlands, 58s. to 65s.; North, 57s. to 62s. 6d. per ton *ex* works. Refined tar, 42s. per barrel (free) on rail.

Pitch: London, 125s. per ton; East Coast, 112s. 6d. to 117s. 6d. per ton; West Coast, 105s. to 115s., with Manchester 105s. per ton, and Glasgow 110s. per ton; South Wales, 120s. per ton.

Solvent Naphtha: London, 3s. 8d. Provinces average 3s. 5d. per gallon.

Crude Naphtha: Naked, 10d.; North, 9d. per gallon.

Heavy Naphtha: 3s. 2d. per gallon.

Naphthalene: Refined, £25 per ton nominal; crude, £8 to £12 10s., according to quality.

Toluol: Naked, 2s. 9d. per gallon nominal. North, 2s. 7d. Pure, 3s.

Creosote: London, 10½d.; North, 9½d. to 10d.; heavy oil, 9d. per gallon in bulk.

Anthracene: 40-45%, 9d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Aniline Oil: 1s. 7d. to 1s. 8d. per lb., drums free.

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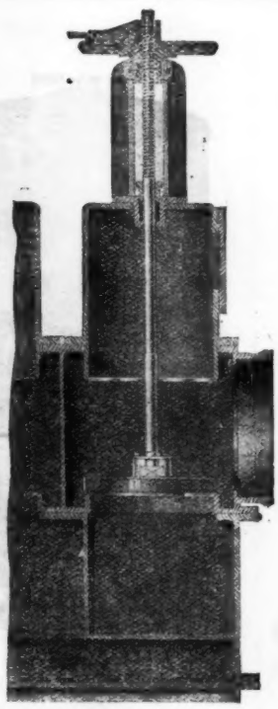

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Cresylic Acid: 95%, 3s. to 3s. 3d.; 97-99%, 3s. 3d. to 3s. 6d. per gallon *ex* works London, f.o.b. other ports.

Carbolic Acid: Crude 60%, 3s. 8d. per gallon; crystals 40%, 1s. 2d. to 1s. 3d. per lb.

Sulphate of Ammonia.

Demand continues to increase, and, in spite of improved outputs, those who have not placed orders stand little chance of obtaining supplies for some time. Export trade is very limited, and foreign buyers are having to pay continually advancing rates; £35 per ton having recently been reported. This figure would not be excessive in view of current quotations for nitrate of soda—viz., £26 10s. per ton. From America it is reported that sulphate of ammonia has again come to the front under persistent export buying. The movement, however, is declared to be entirely controlled by available supplies. Record prices continue; and it is suggested that while it seems bidders at high figures are in many instances in a position to obtain material, the condition of the market is such that there is no way to judge just what quantity of sulphate could be obtained. There is good buying of sulphuric acid on the part of fertilizer manufacturers.

Coal and Irish Gas Supplies.—Ballymena is among the Irish towns which have been threatened to be left gasless owing to coal shortage. The situation improved only slightly last week; the chief difficulty being to obtain ships to bring the coal across Channel. It is understood, however, that everything possible is being done by the Controller; and the hope is entertained that matters will soon be well on towards normal.

Gas Light and Coke Company's Rebate.—The Gas Light and Coke Company intimate to prepayment consumers that, owing to the reduction in the price of coal for domestic use, they are in a position to make an allowance at the rate of 7½d. per 1000 c.ft., thus increasing the amount returned from 5½d. to 1s. 1d. in respect of each 1000 c.ft. of gas consumed. This is in respect to meters set to give 14 c.ft. of gas for each penny. Users of a meter set to give 16 c.ft. will have returned 4d. in respect of each 1000 c.ft. of gas consumed.

The Woodall-Duckham Vertical Retort and Oven Construction Company, Ltd.—In connection with the registration of the new private Company and the winding-up of the old one [*ante*, p. 456], it has been necessary to formally call a meeting of creditors; but in doing so, the Liquidator says he wishes clearly to explain that the Company is being wound-up solely for the purpose of reconstruction, and that a new Company called the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., has already been duly incorporated, and is acquiring the goodwill and assets, and will provide for the liabilities of the liquidating Company. The new Company will carry on the undertaking of the old Company in unbroken succession, and under the same Directorate, and with the same membership; and no dislocation of business will ensue.

Presentation to Mr. J. W. Broadhead.

On Monday evening of last week, the officers, N.C.O.'s, and men of No. 2 Company of No. 1 Group, W. Rid., R.A.S.C., M.T. (V.), had a smoking concert at the Constitutional Club, Elland, during which a presentation was made to their O.C., Captain J. W. Broadhead, in honour of his recent marriage, and as a mark of their appreciation. Major Teasdale, the County Adjutant, Major Clegg, Commanding Officer of No. 1 Group, Major Learoyd, and Captain Shadbolt, of Grantham, were present. The presentation, which consisted of a handsome silver-fitted card-table, suitably inscribed, was made by Lieut. J. H. Holroyd, who, on behalf of No. 2 Company, wished Mr. and Mrs. Broadhead every happiness. He dwelt on the splendid manner in which Captain Broadhead had done all in his power to make No. 2 Company one of the best in the group. He also referred to the great attention he had paid to details, and the consideration he had shown to all ranks, which had won for him the esteem and good feeling of the whole company. Mr. Broadhead, in reply, said he felt honoured in having such a handsome present made to him; and on behalf of Mrs. Broadhead and himself, he accepted it as a token of the goodwill and esteem in which he was held by No. 2 Company, of which he was very proud. He referred to the fact that he was satisfied that none of his men had joined with a view of evading Compulsory Service, which was proved by the very small percentage of men who had to join-up as the combing-out process became more severe. Among those who had joined up, all returned except Private Riley—a highly respected and enthusiastic member—who had made the Great Sacrifice. He would always look with the greatest of pleasure upon his connection with the motor transport movement.

Dempster-Toogood Verticals for Batley.—The Batley Corporation Gas-Works are to be provided with new plant, including a Dempster-Toogood installation of vertical retorts. The cost of the work contemplated is estimated at £70,000.

Belfast Gas Prices.—The minutes of the Belfast Gas Committee adopted by the Corporation last week contained a recommendation for a decrease in the price of gas of 4d. per 1000 c.ft. all round; bringing the net price for lighting and heating to ordinary meter consumers to 3s. 4d. per 1000 c.ft. and to consumers in the Cregagh district to 4s. Mr. M'Laurin, in moving the adoption of the minutes, pointed out that one-fourth of the gas supply was measured through auto-meters; the gas being charged 1½d. per 1000 c.ft. more through these than through the ordinary meters. He had the Gas Managers' authority for saying that the gas through slot meters was supplied at this figure at less than cost price. The reason for the extra price was the great cost of the meters, &c., which were all supplied without charge. The slot meters were originally intended for the very poorest class of people. They found, however, that they were used now by the most highly paid artisans and by schools.

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A Combined Water-Heater and Storage-Tank, Gas-Heated.

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The internal metal parts of our "B.T.U." and "Sun" Boilers for hard-water districts are treated with this special preparation, without extra cost, and the lime deposits, which cause so much trouble in other boilers not so treated, are obviated.

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Eastbourne Gas Company.

The report submitted at the half-yearly meeting of the Company stated that the revenue account showed a profit for the six months of £5955. There was a balance of £7217 to the credit of profit and loss account, after payment of the dividends in August. The Directors recommended the following dividends for last half year: 4½ p.ct. per annum upon the "A" stock, 2¾ p.ct. on the "B" stock, and 5 p.ct. upon the preference stock. This would absorb £4182, and, after other payments, leave a balance of £3035 to carry forward. The Chairman (Mr. J. C. Towner), dealing with the report, said the analysis showed that the make of gas per ton of coal was good, and notwithstanding the criticisms of the Lighting Committee of the Corporation, the quality had conformed to the orders received from time to time from the Board of Trade. In the interests of the conservation of coal, they had to manufacture a lower grade of gas, and to re-adjust tens of thousands of stoves and apparatus in the town to suit it. The important scheme of works repairs was still incomplete, owing to the recent strike of iron moulders. The result for Eastbourne had been unfortunate. There was a grave shortage of coke; and had the winter been severe, he was afraid they would also have found it difficult to meet the demand for gas. The sales of gas had, in fact, increased by 7 p.ct.; and the continuous demand for fires and all kinds of apparatus, betokened a growing gas consumption in the future. The financial results were not what they could have wished. The ever-increasing costs were indicated as follows: For every 1000 c.ft. of gas they made, coals had cost 5d. more, wages 3d. more, repairs and maintenance 4½d. more, incidentals ½d. more—a total of 13d. But there was no longer required the war bonus to dependants; so that the net increased cost was 11d. per 1000 c.ft. of gas. Receipts from increased charges for gas and from tar and other products had provided 10d. per 1000 c.ft. of this increased cost; while the reductions in dividend (arising from the increased charges for gas) had provided a saving of 1½d. per 1000 c.ft. Consumers and stockholders alike had been hit harder than ever by economical forces which he and his colleagues had been powerless to control. He understood that the Corporation were to consider the appointment of an expert to say they must not increase the price. He hoped they would succeed; for no one wanted more than did the Directors to see gas reduced in price. But they must do what was right. The dividends as recommended were adopted.

Increased Output at Southgate.—Compared with the corresponding half of 1918, the Southgate and District Gas Company reported an increase in the sale of gas of 17 p.ct. for the six months ended last December. Application was made to the Board of Trade for authority to increase the maximum price of gas; and an advance of 1s. per 1000 c.ft. was sanctioned. By the terms of the Order, the dividends upon the Company's ordinary capital are compulsorily reduced from 10 to 7½ p.ct. per annum for the original ordinary stock and from 7 to 5¼ p.ct. for the additional ordinary stock. The appropriation will require £3634, and leave a balance of £1127 to be carried forward.

An Absorption Scheme at Stoke-on-Trent.

Giving evidence at a local inquiry regarding a borough extension scheme, Mr. Alexander MacKay, Gas Engineer to the County Borough of Stoke-on-Trent, said the gas supply in the Federated area was provided by four municipal gas-works, at Burslem, Fenton, Longton, and Stoke respectively, and by the British Gas Light Company, who for the most part supplied Hanley and Tunstall. The total producing capacity of the four municipal works was 4,500,000 c.ft. per day. He had in prospect a scheme which, if carried out, would result in a great saving; but this would depend upon the absorption of the British Gas Light Company. The production per ton of coal was 13,000 c.ft. at the present moment; but with new plant he hoped to raise it to 21,000 c.ft. This was a moderate estimate, because there were some places where the new plant gave 30,000 c.ft. per ton. With his scheme, he hoped to save £64,000 annually; and so far as the price was concerned, he did not expect that it would be more than 3s. per 1000 c.ft No attempt had been made since the Federation in 1910 to combine the four municipal gas undertakings, until after his appointment in July, 1917. The expenditure involved in his scheme would be fully £1,000,000. This included the proposed purchase of the British Gas Light Company's undertaking. He did not yet know that the Company assented to the scheme. For the whole proposed gas scheme, including Wolstanton and Newcastle, the estimated cost was £1,155,575. The price of gas in the county borough was lower than in the outside areas.

Cheltenham Gas Company.—Mr. R. Ticehurst presided at the annual meeting of the Company, and in moving the adoption of the report and accounts, observed that wages had again advanced by a large sum. In the year before the war the wages bill was £6394; in 1917, £12,283; in 1918, £19.336; and in 1919 wages and bonuses reached the enormous total of £28,256, or more than four times the amount of the pre-war total, when the output of gas, being unrestricted, was greater than in 1919. It was certain this figure would further advance during the current year, owing to a recent award of the Government Industrial Court, giving another 5s. a week to gas-workers. In the case of their Company it would mean an addition of nearly £4000 per annum. Sales of gas had produced some £1600 over the previous year. Unfortunately, the enlarged receipts had been exceeded by the excess expenditure, with the result that the balance carried to profit and loss (£5692) was £9850 less than in the previous year. By the aid of the amount brought forward, the Directors were able to declare a full half-year's dividend at the rate of 5 p.ct. to June 30 last, amounting to £6798; but the balance of the profit and loss account was only £5168, which was merely sufficient to pay 2½ p.ct. for the six months to Dec. 31. With the sanction of the shareholders, however, the Directors proposed to take £3629 from the reserve fund, so as to enable the statutory rate of 5 p.ct. to be declared. The report was adopted.

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The Carron selection embraces every type of Gas Cooking and Heating Appliance, which give satisfying service wherever in use.

Carron Company will be pleased to place their services—without obligation—at the disposal of Local Authorities contemplating Housing Schemes.

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Spenborough Gas Undertaking.—The Spenborough Urban District Council have adopted a sliding-scale of charges for gas for industrial uses. The first 100,000 c.ft. will be 4s. 2d. per 1000 c.ft., less 10 p.ct. discount. Mr. Collier (the Chairman of the Committee) announced that the results of the past year's working at Cleckheaton were likely to be very satisfactory. Members of the Council from Liversedge and Gomersal—the two other towns which make up Spenborough—suggested that the purchase of the private gas undertakings there might well be considered.

Ilfracombe Gas Company.—The Directors of the Ilfracombe Gas Company reported at the annual meeting that the profit and loss account showed an available balance of £1473, after paying an interim half-yearly dividend of 2½ p.ct. on the preference stock and 1⅝ p.ct. on the consolidated ordinary stock. The Company had had to raise the price of gas to 5s. 4d. per 1000 c.ft. The Directors were pleased to report that there had been a record increase in the sales of gas during the past year, and they had under consideration the necessity for the installation at an early date of labour-saving appliances in the retort-house. The meeting adopted the report and balance-sheet.

Cost of Carburetted Water Gas.—Mr. J. P. Leather, the Engineer and Manager of the Burnley Corporation Gas-Works, reports a surplus for the year just closing of £13,620; and in estimating a surplus of only £285 for next year, he points out in a special report the difficulties gas undertakings are in. He says it is hard to see where an increased quantity of coal is to come from. He had therefore estimated on the basis of 630,000,000 c.ft. of coal gas and 210,000,000 c.ft. of carburetted water gas, with a consumption of only 1 gallon of oil per 1000 c.ft. of the latter. He would have much preferred to use 2 gallons per 1000 c.ft., and so improve the quality; but unless more coal could be obtained, they could not afford to do so. Even so, the cost of the carburetted water gas would be 1s. 6d. per 1000 c.ft. more than coal gas. The high price of residuals enabled coal gas to be made at a reasonable figure, if the coal could be secured; but gas oil was now practically 1s. per gallon, and produced no residuals. Last year they absorbed the whole of their reserve fund (£15,109), and carried over a deficiency of £577. All the present estimated surplus (£13,620) should therefore be used to make-up the reserve fund again as far as possible.

STOCK MARKET REPORT.

There was no improvement to speak of in the general state of things in Capel Court last week, and the Exchange had an agitated time. The money problem, of course, was still the *crux* of the position; and it was remarkable how the forecasts of experts as to the action of the Bank Directors on Thursday differed.

The gilt-edged market was the storm centre. Home Government securities opened very dull, and for the first half of the week all issues fell freely. The absence of a change in the Bank rate enabled some recovery to be effected; but even this left several issues (notably Consols and Victory) below the level of the week before. The closing day showed Consols 49⅛-49⅜, War Loan 88-88⅝, Funding 69⅛-70⅝, Victory 78⅛-79. Colonial issues also were flat. Home Rails were little dealt in; the prevailing disposition being to wait and see. In result, they were little changed. Canadians showed weakness; Argentines were rather variable.

The Foreign Market on the whole was dull. French tried to cheer-up on the strike being arrested, but was beaten by the Exchange; the franc value reaching 50 on Friday. Belgian, Chinese, Japanese, and Brazilian were the best. In Miscellaneous, Rubber was dull, and Oil very variable. Shipping was quite out of favour.

Business in the Gas Market was rather quieter, and presented no incident of a noteworthy character. Prices and quotations of the previous week were scarcely varied. Gas Light ordinary was remarkably steady, done every day at from 59⅛ to 60⅛. South Metropolitan was equally firm. In the Suburban and Provincial category, the only changes were a rise of 1 each in Bournemouth "B" and South Shields. Imperial Continental was almost somnolent, with only seven bargains at rather low figures. Primitivas had a fall in prices—the ordinary from 33s. to 27s. 6d., and the preference from 65s. to 57s. 6d.

Bargains done for cash during the week were as follows: Monday, Commercial 4 p.ct. 54½, Gas Light ordinary 59⅛, 59⅜, 60, 60⅛, ditto preference 58, 59⅛, 59⅜, Hastings and St. Leonards 3½ p.ct. 40½, Imperial Continental 132, Primitiva 30s., 33s., ditto preference 65s., San Paulo 7⅛, South Metropolitan 59½, 59⅜, Tottenham "B" 50. On Tuesday, Commercial 4 p.ct. 54½, Gas Light ordinary 59⅛, 59⅜, 60⅛, 60⅜, ditto maximum 40, ditto debenture 50½, Hastings and St. Leonards 3½ p.ct. 41, Imperial Continental 132, 133, Primitiva 28s. 9d., 30s., 30s. 9d., ditto preference 60s., 61s. 3d. On Wednesday, Bournemouth "B" 9½, 9⅝, Gas Light ordinary 59⅛, 59⅜, 60, 60⅛, ditto maximum 40, Imperial Continental 134, Primitiva 28s. 9d., 29s. 9d., 30s. 6d., ditto prefer, ence 61s., South Metropolitan 59⅜, 60, 61-Tottenham "B" 48, ditto debenture 60, Wandsworth debenture 48. On Thursday, Continental Union 32½, European 9, Gas Light ordinary 59⅛, 59⅜, 60⅛, ditto maximum 42, ditto preference 58⅝, Imperial Continental 132, 133½, Portsea "B" 69⅜, ditto "C" 61⅜, South Metropolitan 60, 60⅜, 60⅝, Portsea "A" 10½ p.ct. 73⅜, ditto "D" and "E" 7½ p.ct. 49½. On Friday, Commercial debenture 49, European 9, Gas Light ordinary 59⅛, 59⅜, 60, 60⅛, ditto preference 59, Imperial Continental 132, Primitiva 27s. 6d., ditto preference 57s. 6d., South Metropolitan 59⅛, 60⅛, Tottenham "B" 48.

In the Money Market, large supplies came forward, and the bogey of a higher Bank rate was layed; the result being a condition of marked ease. The Bank rate is 6 p.ct., as fixed on Nov. 6, 1919.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Shares	When last Dividend	Ante-War Dividend & Bonus. p.c.	Last Dividend.	NAME	Closing Prices July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
129,049	Stk	July 31	4	4%	Aldershot 4 p.c. Pref.	..	60—65	..
1,661,868	,,	Sept. 26	2½	2½%	Alliance & Dublin Ord.	66—64	43—48	..
574,000	,,	Jan. 15	4	4%	Do. 4 p.c. Deb.	75—79	61—63	..
250,000	5	Oct. 30	7½	8%	Bombay, Ltd.	57—62	5—5½	..
50,000	10	Feb. 26	16	10%	Bourne-mouth Gas and Water { 10 p.c.	20—30	8½—9½*	..
228,110	10	,,	7	7%	B 7 p.c.	15—15½	9—10*	9½—9⅝
115,300	10	,,	6	6%	Pref. 5 p.c.	13½—14	9—9½*	
162,065	—	Dec. 30	—	4%	4 p.c. Deb.	..	64—66	..
993,045	Stk.	Feb. 12	14	80/-	Brantford & Consolid.	251—256	48—53	..
734,929	,,	,,	11	26 8	Do. B New	204—209	43—48	..
55,000	,,	,,	5	6%	Do. 5 p.c. Pref.	109—111	74—76	..
221,490	,,	Dec. 11	4	4%	Do. 4 p.c. Deb.	91—93	54—56	..
214,775	,,	Sept. 11	11	7½%	Brighton & Hove Orig.	205—213	128—128	..
344,280	,,	,,	8	5½%	Do. A Ord. Stk.	154—159	84—87	..
1,287,500	Stk.	Feb. 26	5	5%	Bristol 5 p.c. max.	..	..	..
680,000	10	Sept. 26	12½	10%	British	44—45	25—27	..
190,000	Stk.	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	85—90	61—63	..
345,771	,,	,,	4	4%	Buenos Aires 6 p.c. Deb.	65—67	47—50	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	6½—7½	..
160,000	10	Oct. 30	—	4½%	Do. 4½ p.c. Pref.	4—6	6½—7	..
100,000	Stk.	Dec. 30	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	58—63	..
167,150	,,	Dec. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	..
1,518,280	,,	Feb. 26	6/0/4	33/4	Commercial 4 p.c. Stk.	103—108	54—59*	54½
560,000	,,		5½	26/8	Do. 3½ p.c. do.	103—105	50—55*	
475,000	,,	Dec. 11	5	5%	Do. 3 p.c. Deb. Stk.	69½—71½	49—51	49
500,000	,,		4	—	Continental Union Ltd.	76—79	27—32	32½
200,000	,,		2	—	Do. 7 p.c. Pref.	115—118	40—60	..
51,600	Stk.	Feb. 26	14½	10½%	Croydon A 10 p.c.	..	130—140*	..
270,400	—	,,	11½	7½%	Croydon B and C 7 p.c.	..	90—100*	..
492,310	Stk.	—	6	5%	Derby Con. Stk.	132—136	..	..
55,000	,,	—	4	4%	Do. Deb. Stk.	103—104	..	..
1,002,180	10	Jan. 29	10	5/0	European, Ltd.	17½—18	9½—10½	9
16,298,975	Stk.	Feb. 12	4/17/4	80/-	Gas { 4 p.c. Ord.	98—102	58 61	59¼—59⅝
2,600,000	,,	,,	9¼	26/8	Light { 3½ p.c. max.	76—79	40—45	40—42
4,062,235	,,		4	4%	and { 4 p.c. Con. Pref.	96—99	58—61	58—59⅜
4,674,856	,,	Dec. 11	8	8%	Coke { 3 p.c. Con. Deb.	72½—74½	50—52	50½
180,000	,,		10	10%	10 p.c. Bonds	..	..	..
82,500	,,	Sept. 11	5	3⅜% †	Hastings & St. L. 5 p.c.	..	57—62	..
258,740	,,	,,	3½	2⅜% †	Do. 3½ p.c.	37—39	40—45	40¼—41
70,000	10	April 29	11	7%	Hongkong & China, Ltd.	16½—18½	8½ 9½	..
26,500	Stk.	Aug. 28	9	6½ †	Hornsey 7 p.c.	..	90—95	..
181,000	,,	Sept. 11	11	7⅜%	Ilford A and C.	151—154	88 44	..
65,750	,,	,,	6⅜	4⅜%	Do. B.	115—118	67—72	..
62,500	,,	Dec. 30	4	4%	Do. 4 p.c. Deb.	92—94	59—63	..
4,948,980	,,	May 14	9	4½%	Imperial Continental	128—129	132—137	132—134
1,335,000	,,	Feb. 12	8½	8½%	Do. 3½ p.c. Deb. Red.	84—86	85—90	..
235,249	,,	Sept. 11	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	86—91	..
2,493,995	,,	Feb. 28	19	37/6	Liverpool 5 p.c. Ord. { A	211—213	..	..
					{ B	146—148	..	..
806,068	,,	June 28	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	..
165,786	,,	Feb. 26	7/5/6	33⅓%	Maidstone 5 p.c.	..	54—59*	..
75,000	5	June 11	5	5%	Malta & Mediterranean	4½—4¾	1½—2½	..
250,000	100	Oct. 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	90—97	..
541,220	Stk.	Nov. 27	4	5%	Monte Video, Ltd.	11½—13	72—77	..
1,875,893	,,	Feb. 26	4½	3½%	Newcastle&Gateh'd Con.	98½—99½	63½—64½*	..
292,786	,,	Dec. 30	3½	3½%	Do. 3½ p.c. Deb.	65—68	56—57	..
15,000	10	Sept. 11	—	11%	North Middlesex 10 p.c.	..	18½—18½	..
55,940	10	,,	7/14/0	7½	,, ,, 7 p.c.	14—15	9—9⅜	..
809,808	Stk.	Nov. 27	6	6%	Oriental, Ltd.	117—123	102—105	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7¾	4½—5½	..
60,000	50	Aug. 28	12	7½%	Portsea, Island B	126—131	68 73	69⅜
100,000	50		12	6½%	Do. C	118—121	65—60	61⅜
249,986	5	April 29	5	—	Primitiva Ord.	5½—6	1⅜ 1⅝	27/6—28/-
499,960	5	June 28	5	—	Do. 5 p.c. Pref.	4½—5	2⅜—3½	57/6—58/-
521,600	100	Dec. 1	4	4%	Do. 4 p.c. Deb.	91—93	70—72	..
600,000	Stk.	Jan. 29	4	4%	Do. ,, ,, 1911	..	48—51	..
246,198	,,	Dec. 30	4	4%	River Plate 4 p.c. Deb.	85—87	47—60	..
150,000	10	Sept. 26	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	7½—8	7½
125,000	50	Dec. 30	5	5%	{ 5 p.c. Deb.	47—49	39—41	..
185,000	Stk.	Aug. 28	12	8%	Sheffield A	228—234	75—80	..
309,984	,,	,,	10	8%	Do. B	222—224	75—80	..
528,500	,,	,,	10	4½%	Do. C	220—228	75—80	..
133,201	Stk.	Sept. 12	4	4%	Shrewsbury 5 p.c.	..	..	..
90,000	10	Oct. 15	9	10%	South African	10½—11½	12—13	..
5,609,895	Stk.	Feb. 12	5/4/0	80/-	South Met. 4 p.c. Ord.	111—118	58—61	59½—61
350,000	,,	Jan. 15	—	5%	Do. Pref.	..	93—95	..
1,895,445	,,	,,	8	8%	Do. 3 p.c. Deb.	72½—74½	50—52	..
284,820	,,	Feb. 26	8½	8%	South Shields Con. Stk.	167—169	104—106*	..
1,087,795	,,	Aug. 14	6	8½%	S'th Suburb'n Ord. 5 p.c.	114—116	66—71*	..
247,558	Stk.	Dec. 30	5	5%	Do. 5 p.c. Deb. Stk.	116—118	78—83	..
647,740	,,	Nov. 18	7½	8½%	Southampton Ord.	92—102	61—63	..
121,275	,,	Dec. 30	4	4%	Do. 4 p.c. Deb. Stk.	..	61—63	..
120,000	,,	Aug. 14	—	8½%	Tottenham { A 5 p.c.	135—138	68—78*	..
789,375	,,	,,	6	9%	District { B 3½ p.c.	115—117	48—53*	48
181,365	,,	Dec. 11	4	4%	{ 4 p.c. Deb.	87—89	63—65	60
189,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	48—50	..
265,476	Stk.	Sept. 26	5	3½%	Tynemouth 5 p.c. max.	102½—109	74—76	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	,,	Feb. 26	80	55/-	Wandsworth A 5 p.c.	151—156	89—88*	..
255,686	,,	,,	6½	40/-	Do. B 3½ p.c.	129—134	61—66*	..
108,075	,,	,,	—	38/6	Do. C	..	61—66*	..
140,865	,,	,,	—	38/6	New Ordinary	..	61—66*	..
262,000	,,	,,	6½	38/9	Wimbledon 5 p.c.	117—122	68—68*	..
96,000	,,	,,	6½	40/-	Epsom 5 p.c.	121—126	68—68*	..
88,416	,,	Dec. 30	8	8%	8 p.c. Deb. Stk.	66—69	48—50	48

* Ex Div. † Next dividend will be at this rate.

Welsbach Light Company's New Capital.—The shareholders in the Welsbach Light Company, Ltd., agreed at an extraordinary meeting on Friday to the issue of 90,000 £1 shares, which they will have the right to subscribe for at par, at the rate of one new share for every two existing shares. The Chairman (Mr. J. R. Yates) explained the reasons for this increase in capital.

South London Gas Consumers' Defence League.—A deputation of the South London Gas Consumers' Defence League, led by Mrs. G. Warwick, last week waited upon Dr. Charles Carpenter in regard to the Bill of the South Metropolitan Gas Company which is now before Parliament. Dr. Carpenter pointed out how, under the proposals of the Bill, the gas consumers might be expected to benefit.

Wages in the Gas Industry.—The Industrial Court set up under the Industrial Courts Act of last year, whose functions are to hear the parties in cases of dispute between employers and employees as to wages and conditions of labour, opened at Manchester last Wednesday. A number of cases were heard, the most important being raised by the Gas Department of the Manchester Corporation, on an award affecting the whole of the gas undertakings of the country. The proceedings are conducted in private; and the Court is presided over by Sir William Mackenzie, K.C.

Drogheda Gas Undertaking.—At a meeting of the Drogheda Corporation, the new Gas Committee reported that the works were, as they had found as a result of close examination, in a most dilapidated condition, and they could not accept responsibility for the future of the concern without securing a report from an independent expert. They had, therefore, decided to ask the Local Government Board for Ireland to appoint such an expert. The Committee also reported that leakage from mains and service-pipes could not be so easily detected, owing to the extraordinary fact that there was no map of the gas-mains in existence. Sir D. Harrel, as Arbitrator, has awarded an increase of 5s. per week to stokers in the gas-works, with time-and-a-half for Sundays.

Gas Industry Council for Lancashire and Cheshire.—At the annual meeting of the Lancashire and Cheshire Regional Council for the Gas Industry, held at Manchester, Mr. J. Williams, J.P., a representative of the workmen's side, was elected Chairman of the Council for the ensuing year. Alderman F. S. Phillips, J.P. (the Chairman of the Salford Corporation Gas Committee), was elected Vice-Chairman; Mr. J. H. Sillitoe (of the Manchester Corporation Gas Department), Secretary, and Alderman R. Burtles (the Deputy-Chairman of the Manchester Corporation Gas Committee), Hon. Treasurer. The annual report states that a set of working conditions for the gas industry in the Lancashire and Cheshire district has been agreed upon by the Council, and was awaiting the approval of the National Joint Council before being put into operation. The employers and employees have worked amicably together during the past year.

Leighton Buzzard's Moderate Gas Price.—Mr. R. Richmond, the Chairman of the Leighton Buzzard Gas Company, confessed at the annual meeting that he could not explain why they were able to supply gas well over the average quality, at a price considerably less than all the neighbouring towns. Hitherto they had only compared their prices with works of similar size; but he had a list of seventeen towns, all within a radius of about 40 miles, and with annual makes of gas up to just over 900 million c.ft. Only at Northampton, with a make of 918 million c.ft. was the price under 3s. 6d.; and there was only one other town less than 4s.—considerably nearer the coal-fields than Leighton Buzzard. The average price for the seventeen towns was 4s. 6d. per 1000 c.ft.—*i.e.*, 1s. more than Leighton Buzzard. One reason for their satisfactory position was the low capital employed. If they had paid the full 5 p.ct. dividend, it would only have added 1d. to the price per 1000 c.ft. of gas sold. Other reasons were good management, loyal work by all the staff, and keeping the plant and machinery in good repair, notwithstanding the high cost of materials and labour. A dividend at the rate of 4 p.ct. per annum (less income-tax) was declared.

The Ennis Gas Consumers' Company, Ltd., is being wound up; and the undertaking is being offered for sale as a going concern, subject to approval of the Chancery Court of Ireland.

Batley gas consumers have for long been insistent in their complaints about the quality of the gas supplied to them. The authorities are now taking active steps to remedy the grievance, and repairs are being effected to the gas plant. The main cause of the complaints is, however, the bad quality of the coal.

The London offices of Messrs. R. & J. Dempster, Ltd., are now at No. 34, Victoria Street, Westminster, S.W. 1. These offices were requisitioned during the war by His Majesty's Office of Works. Messrs. Dempster removed last week from the temporary offices that they occupied at Blenheim Mansions, Broadway.

The London County Council, on the recommendation of the Public Control Committee, have increased the maximum salary of the inspecting gas examiners from £250 to £300 a year. The Committee pointed out that the work of gas testing has increased in complexity and importance; and as a result of the recent report of the Fuel Research Board, the existing gas statutes may shortly be largely remodelled.

Under a revised scale for Glasgow gas consumers, charges for the installation of gas fires and radiators are to be increased by 50 p.ct.; rates of hire for gas fires and radiators, by 50 p.ct.; and rentals for stand-by and check meters in public works, by 100 p.ct. The charge for re-connecting and turning on gas is to be made 2s. 6d. The policy of installing small cooking appliances on free loan, which has been in abeyance for some time, is to be resumed.

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One 1¼ in. capacity Foster TURRET LATHE, Bar Feed, Cut-off Rest, Pump. Good Condition.
Two New Cincinnati Acme CAPSTAN LATHES, 1½ in. capacity. Auto feed to Capstan.
Seven New Wells CAPSTAN LATHES, ¾ in. capacity, ¾ in. hollow Spindle.
One 1 in. Dreses CAPSTAN LATHE. Good Condition.
One New Richards Type Turret BORING LATHE, admit 32 in. diameter in Gap.
One 26 in. swing Darling & Sellars BORING and SURFACING LATHE, 8 ft. bed, as new.
Six 8½ in. by 8 ft. Gap Bed S.S.S. and Sc. LATHES with Pump. As New.
Three New 9¼ in. by 8 ft. Straight Bed S.S.S. and Sc. LATHES, PUMP, and CHUCK.
Two 8 in. Centre by 6 ft. bed Lang S.S.S. and Sc. LATHES, as new.
Two 9½ in. by 8 ft. straight bed SLIDING SURFACING and BORING LATHES, by Denham.
Five 9½ in. by 10 ft. straight bed "New Haven" SLIDING SURFACING and SCREWCUTTING LATHES, to admit 5 ft. 6 in. between centres. As New.
Several 6½ in. by 6 ft. straight bed American LATHES. Second-Hand.
One New RING GRINDER, with 8½ in. Magnetic Chuck.
Two New Universal Tool and Cutter GRINDERS.
Three Wet Tool GRINDERS. as new.
COLUMN DRILLS, TOOL SHARPENERS, CUTTER GRINDERS, BACKING-OFF ATTACHMENTS, CHUCKS, VICES, HACKSAW BLADES.

Full Particulars on application to—
THE JUDSON-JACKSON COMPANY, LTD., 50, MARSHAM STREET, WESTMINSTER, LONDON, S.W. 1.

THE Uxbridge Gas Company have for DISPOSAL, at their Eton Works:

Three Lengths of Steel HYDRAULIC MAIN "D" section, 18 in. by 18 in., 8 ft. 6 in. long, with 5 in. ASCENSION and DIP PIPES.
Belt-Driven EXHAUSTER (Gwynne & Beale), about 5000 c.ft. per hour.
Two 8 ft. square PURIFIERS, 14 in. Lute, with Lifting Apparatus.
Two 8 ft. Square Dry Lute PURIFIERS.

May be inspected at any time, and Offers to be sent to the MANAGER, GAS-WORKS, UXBRIDGE.

THE Newcastle-upon-Tyne and Gates- HEAD GAS COMPANY have FOR DISPOSAL the under-mentioned FITTINGS for Thirteen Beds of Nine Retorts 22 in. by 15 in. by 20 ft. long:

234 ∩-shaped CAST-IRON MOUTHPIECES.
ASCENSION PIPES and BENDS.
BRIDGE and DIP PIPES.
HYDRAULIC MAINS, each 10 ft. 6 in. long.
12-in. FOUL MAIN.

The Benches are now being Dismantled, and the Fittings may be Inspected at the Redheugh Gas-Works, Gateshead-on-Tyne.

Further Particulars can be had on Application to the CHIEF ENGINEER, ELSWICK GAS-WORKS, NEWCASTLE-UPON-TYNE.

GREAT YARMOUTH GAS COMPANY.

RECONSTRUCTION OF WORKS.

THE above Company will shortly have FOR DISPOSAL the following PLANT, now at work at the Great Yarmouth Gas-Works:

1.—One Two-stage AIR COMPRESSOR by West's Gas Improvement Company, for pressures up to 75 lbs. per square inch, complete with Receiver.
2.—Two West's Compressed Air Scoop CHARGING MACHINES suitable for Three Tier Retort Benches (Throughs or Stop Ends).
3.—Two West's Compressed Air Rake DRAWING MACHINES.
4.—Two 10 H.P. Vertical STEAM-ENGINES.
5.—Complete Retort Bench IRONWORK for Six Beds of Eight 20 ft. Through Retorts 19½ in. by 15½ in. (Ascension Pipes each side of Beds).
6.—Numerous SPARE PARTS for 1, 2, and 3 above.
7.—One 20,000 Cubic Feet per hour STATION METER, with Valves and Connections, by the Gas Meter Company, now being replaced by a 60,000 c.ft. per hour Meter.
8.—Two Avery Platform WEIGHING MACHINES, suitable for Weighing the above Charging Machines with their Charges of Coal.
9.—20 New RETORTS, 19½ in. by 15½ in. ∩ section, 10 ft. long, loose ends, by Messrs. Gibbons Bros., Dudley.

The above may be Inspected by arrangement with the undersigned, to whom Tenders, for all or any portion of same, should be sent not later than March 25 next.

P. D. WALMSLEY, B.Sc.
General Manager.

Gas Company's Offices,
42, King Street,
Great Yarmouth.

FOR SALE.—De Brouwer Pusher and CHARGER MACHINES. Suitable for Beds of Ten 20 ft. retorts. Five Ton Hopper on Charger. Both Machines have been Completely Overhauled and are in Excellent Condition.

Apply No. 6864, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.